



US 89 WILDLIFE & TRANSPORTATION ASSESSMENT

KEY FINDINGS



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COMMUNITY-LED COLLABORATION

Yellowstone Safe Passages (YSP) began with the recognition that a community-led partnership would be best equipped to address and resolve wildlife-vehicle conflicts (WVCs) in the watershed. YSP is a partnership of organizations and individuals who live, work, and recreate in the Upper Yellowstone Watershed. The partnership consists of state and federal agency representatives, private foundations, community groups, conservation groups, business owners, and local landowners and citizens who aim to enhance the safety of people and wildlife traveling US Highway 89 (US 89). YSP envisions the Upper Yellowstone Watershed to be a place where visitors and locals can travel the highway without wildlife-related accidents and where the highway doesn't act as a barrier to the movement of Yellowstone's wildlife populations.





YSP is recognized as a leading model for community-based, collaborative partnerships addressing WVCs in Montana. The partnership was founded on the principles of being diverse in skills, well-informed, and well-resourced. The core leadership team demonstrates these character traits through their collaborative culture. In 2022, Yellowstone Safe Passages partnered with the Center for Large Landscape Conservation and the Western Transportation Institute to develop a fine-scale Wildlife and Transportation Assessment (“Assessment”) of US 89 from Livingston to Gardiner. Additional collaborators include Montana Freshwater Partners and Native American Cultural Consultant, Dr. Shane Doyle. The authors are Elizabeth Fairbank, Kristeen Penrod, Dr. Marcel Huijser, Matt Bell, Damon Fick, Leah Swartz, Ashton Bunce, Braden Hance, and Anna Wearn. To read the Assessment’s full report, visit www.yellowstonesafepassages.org/highway-assessment.



WHY DO WE NEED AN ASSESSMENT?

The US 89 Wildlife & Transportation Assessment combines local and expert knowledge, public data, citizen science, and engineering expertise to identify important areas where wildlife accommodation measures—such as culverts, bridges, underpasses, overpasses, animal detection systems and fencing—can improve the safety of travelers and wildlife by reducing wildlife-vehicle collisions.

1.

THE STATUS QUO IS RISKY AND EXPENSIVE

- Collisions involving wildlife make up 50% of all reported crashes on US 89.^a Across Montana, the statewide average is 10%, while the national average is 5%.^b
- A driver in Montana has a 1 in 53 chance of hitting an animal every year — the second highest of any state in the nation. 1 in 127 is the average chance across the U.S.^c
- Between 2012 and 2023, the report estimated the direct cost of WVCs in the Upper Yellowstone Watershed to be nearly \$32 million.

2.

RESIDENTS, COMMUTERS, AND VISITORS DEPEND ON THIS ROAD

- Visitation to Yellowstone National Park increased by 20% from 2014-2017.^d
- Just under 400,000 vehicles entered the park at the North Entrance in 2023.^d

3.

MORE TRAFFIC IS A PROBLEM FOR WILDLIFE

- Wildlife are sensitive to traffic, losing road crossing opportunities as traffic levels increase.
- Linear infrastructure, such as roads, railways, and transmission lines, is considered one of the most direct threats to ecological connectivity. Roads can create barriers to wildlife movement, limiting the ability of wildlife to find water, food, and mates, and can sever routes used by wildlife to migrate seasonally between winter and summer ranges.



WILDLIFE-VEHICLE CONFLICT

COSTS TO SOCIETY & WILDLIFE

COST OF COLLISIONS

FROM 2012-2023 ON US 89 (BETWEEN GARDINER AND LIVINGSTON)



1,685
ANIMALS

were documented to have been
killed by vehicles



THESE LOSSES AMOUNT TO

\$32
MILLION

in personal injury and property damage

\$72
MILLION

if the intrinsic value of wildlife—which
considers the ability of species to
remain on the landscape—is included.

AVERAGE COST PER COLLISION BY SPECIES

DIRECT COST: VEHICLE REPAIR, HUMAN INJURIES, AND HUMAN FATALITIES

PASSIVE BENEFIT: THE ECONOMIC VALUE HUMANS PLACE ON THE EXISTENCE OF AN ANIMAL SPECIES

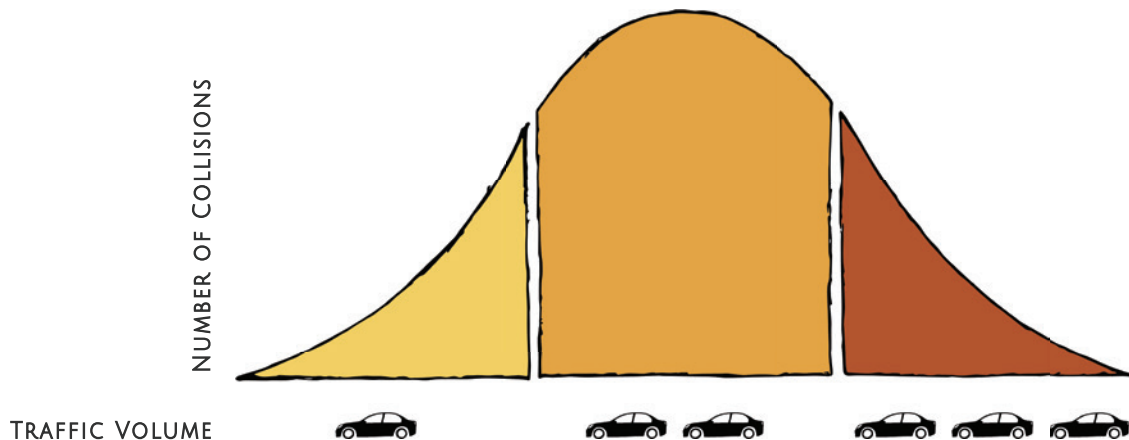
TOTAL COST: INCLUDES BOTH THE DIRECT COST AND PASSIVE BENEFIT

	SPECIES TOTALS	DIRECT COST ^E	TOTAL COST ^E
ELK	270	\$12,270,150	\$19,762,920
MULE DEER	651	\$9,123,114	\$12,426,939
WHITETAIL DEER	652	\$9,137,128	\$12,446,028
UNKNOWN DEER	79	\$1,107,106	\$1,508,031
BIGHORN SHEEP	2	\$28,028	\$38,178
MOUNTAIN LION	3	\$42,042	\$57,267
PRONGHORN	8	\$112,112	\$152,712
GRIZZLY BEAR	6	\$84,084	\$25,498,704
BLACK BEAR	4	\$56,056	\$76,356
MOOSE	7	\$578,522	\$772,779
BISON	3	\$42,042	\$57,267
SUM	1685	\$32,580,384	\$72,797,181

ROADS ARE BARRIERS TO WILDLIFE

TRAFFIC VOLUME AND THE BARRIER EFFECT

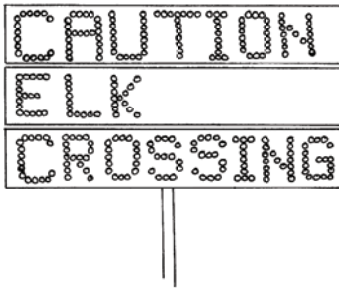
As traffic volumes increase, so does collision risk—until a road becomes a complete barrier to wildlife passage. Noise and habitat alteration are among the biggest reasons wildlife may avoid roads.



SOURCE: SEILER ET AL. 2003; RIGINOS ET AL. 2019

MITIGATION MEASURES & THEIR EFFECTIVENESS

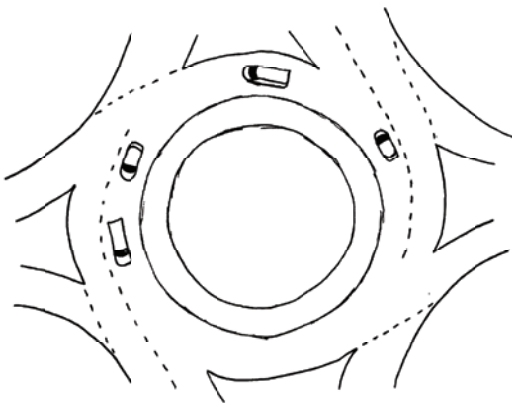
MEASURES AIMED AT INFLUENCING DRIVER BEHAVIOR^F



SEASONAL WILDLIFE WARNING SIGNS
Effectiveness in Reducing Collisions: 9 - 50% (highly variable)
Effectiveness in Maintaining Connectivity: None

ROADSIDE ANIMAL DETECTION SYSTEMS

Effectiveness in Reducing Collisions: 33 - 97% (highly variable)
Effectiveness in Maintaining Connectivity: None



TRAFFIC CALMING MEASURES WITH REDUCED SPEED*

Effectiveness in Reducing Collisions: up to 60%
Effectiveness in Maintaining Connectivity: Unknown (may increase)

*Reducing speed limits without traffic calming measures can lead to more accidents! Many drivers follow the “design speed” of a road rather than its posted speed limit.^g

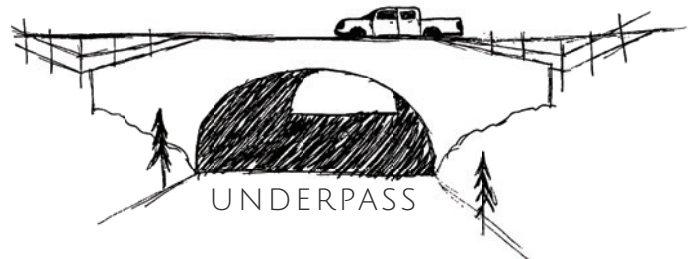
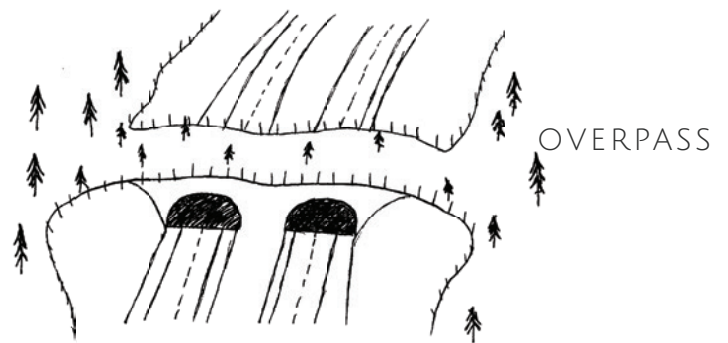
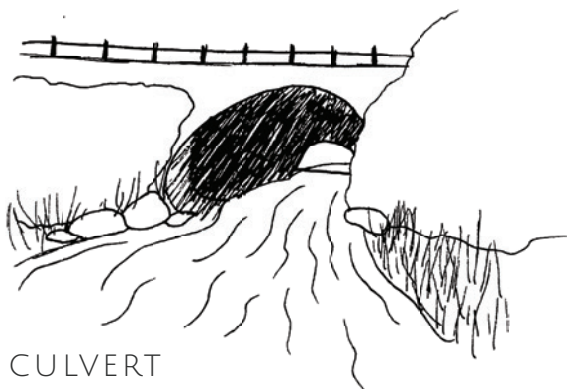
Measures to influence driver behavior have varying degrees of success and do not address the barrier effect of roads on wildlife movement. Separating wildlife from the road and traffic by fencing and enabling safe wildlife passage via dedicated structures achieve the dual objectives of reducing wildlife-vehicle collisions and maintaining habitat connectivity.

MEASURES TO SEPARATE WILDLIFE FROM THE ROAD AND TRAFFIC^F

WILDLIFE CROSSING STRUCTURES WITH FENCING

Effectiveness in Reducing Collisions: 80 - 100%

Effectiveness in Maintaining Connectivity: Maintains habitat connectivity







PRIORITY SITES & RECOMMENDATIONS

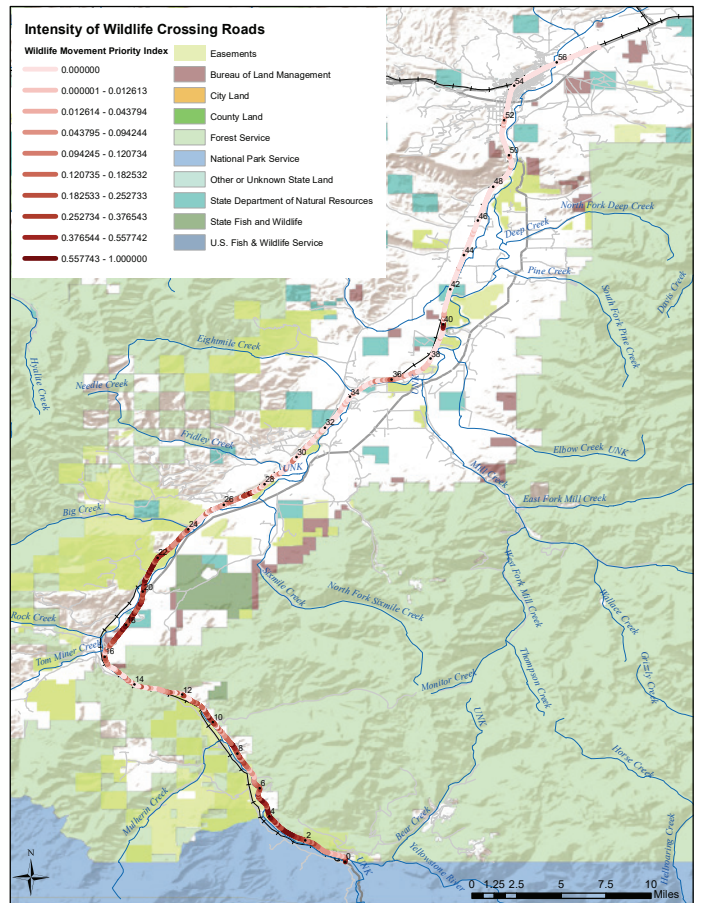
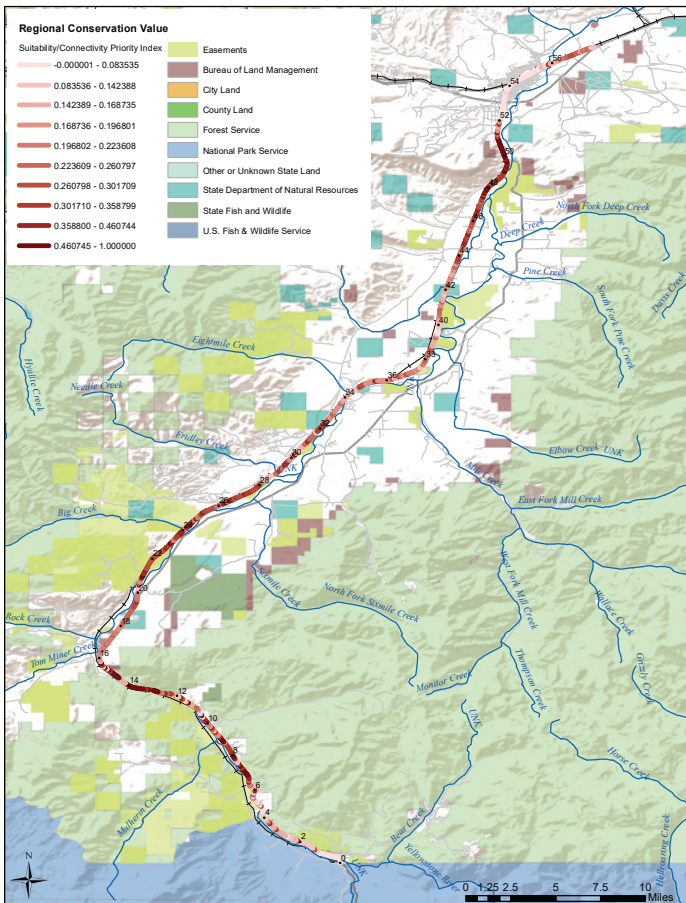
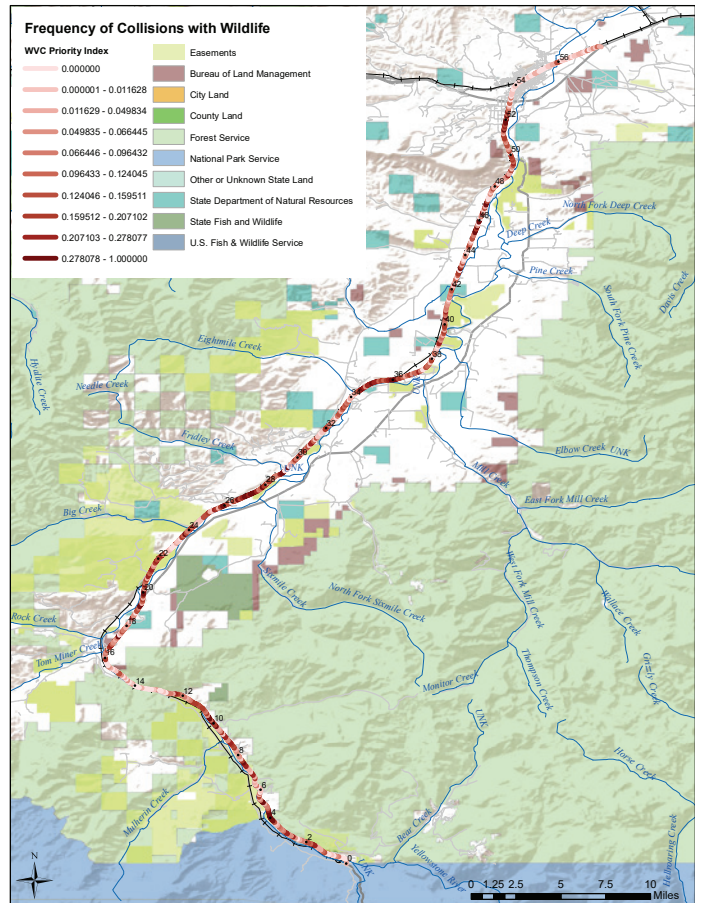
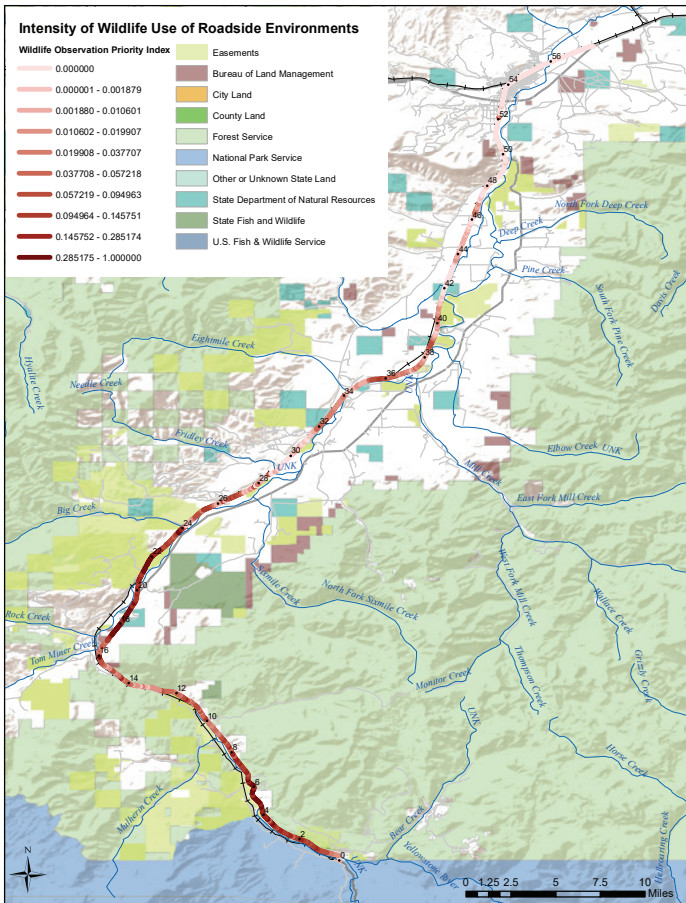
OUR METHODS

Through data analysis and site visits, the Assessment identified seven priority locations that pose elevated risk to human and wildlife safety and where there is a need to maintain or improve habitat connectivity for wildlife.


The data analysis identified an index value (on a scale of 0-1) for every 0.1-mile road segment based on at least 10 years of data for each Prioritization Characteristic. Then, the results were combined into a composite value for each segment. Next, to find areas with consistently elevated values to examine in the field, each road segment was evaluated in light of the five adjacent 0.1-mile segments on either side.

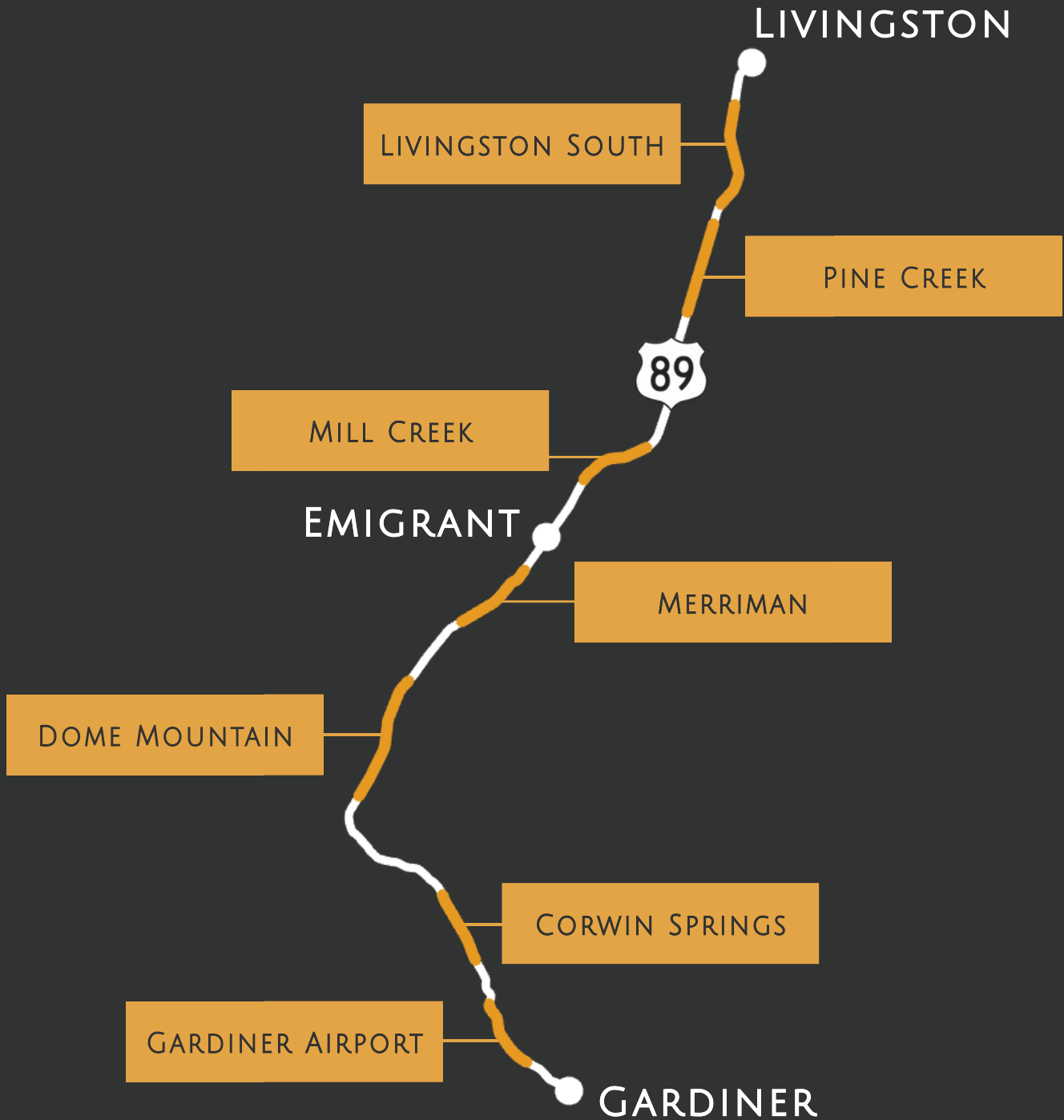
An interdisciplinary team of independent researchers and representatives of federal, state, and county agencies with expertise in wildlife biology, road ecology, engineering, and planning examined locations to consider additional factors.

On site, the team considered land security, local conservation value, mitigation options, barrier effect, and vulnerability using a field evaluation matrix to score each attribute. The team discussion led to the final priority sites and recommendations.



PRIORITY SITE MAP

 = PRIORITY SITE



PRIORITY SITE: GARDINER AIRPORT

US-89 ROAD MILE (RM): 2.3 - 5.4

AVERAGE DAILY TRAFFIC: 2,853

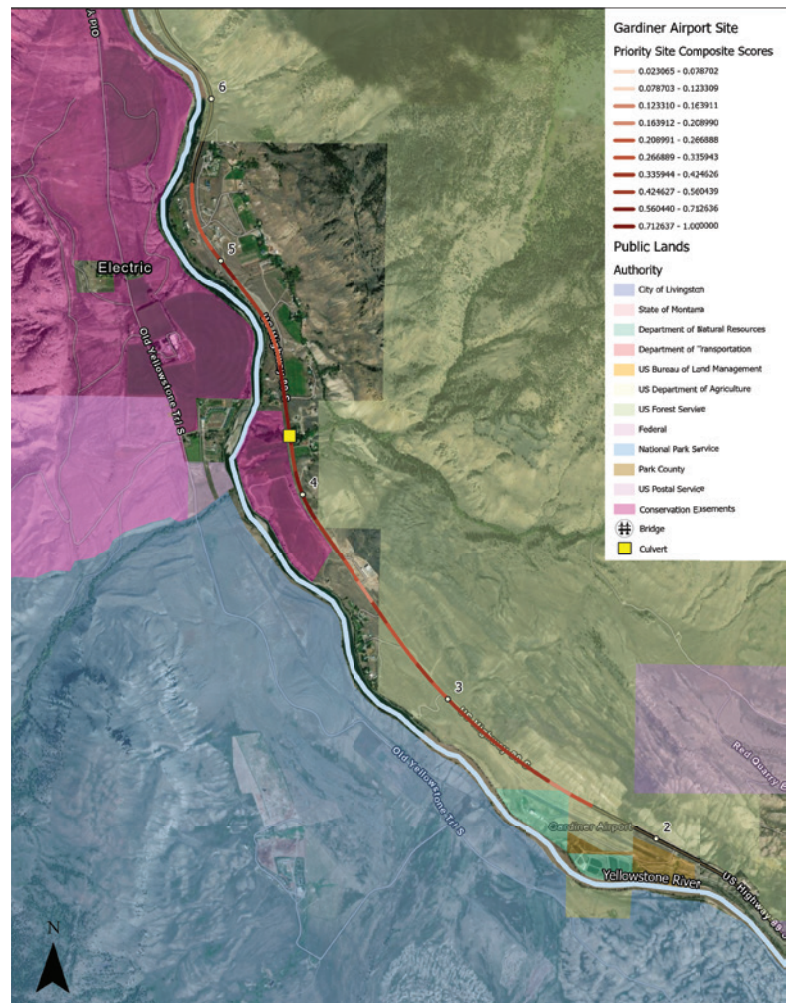
CARCASS DATA: GARDINER AIRPORT (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
79	5	30	2	1	0	1	3	4	0	0	0	125

Located just 2 miles north of the town of Gardiner, this is the southernmost priority site in our study area and is the closest site to Yellowstone National Park (YNP). There is heavy wildlife movement back and forth across the highway for many wildlife species, including the sizeable “town elk” herd that resides primarily in and around the town of Gardiner. The site is within a bison tolerance zone, and bison are present during certain times of the year. Forty-five wildlife-vehicle collisions (WVCs) were reported to law enforcement from 2012-2021. In addition, 125 wild animal carcasses have been recorded, including two grizzly bears. This site contains the 0.10-mile segment (RM 3.8) with the highest composite score of any 0.10-mile segment identified.

RECOMMENDATIONS:

- There are two potential locations where new wildlife crossing structures may be warranted – one just north of Gardiner airport (RM 2.5-3) and one just south of RM 4. Overpasses are the preferred structure type due to the species present in the area including elk and grizzly bears. Both sites have protected land on either side of the highway.

- In addition to the structure(s), fencing will be needed to keep wildlife off the highway, reduce WVCs, and guide animals toward safe crossing opportunities. The fence ends and access roads will need treatments to keep animals from entering the fenced corridor and to warn drivers of animals that may cross the road at the fence ends.



PRIORITY SITE: CORWIN SPRINGS

US-89 ROAD MILE (RM): 7.6 - 10.5

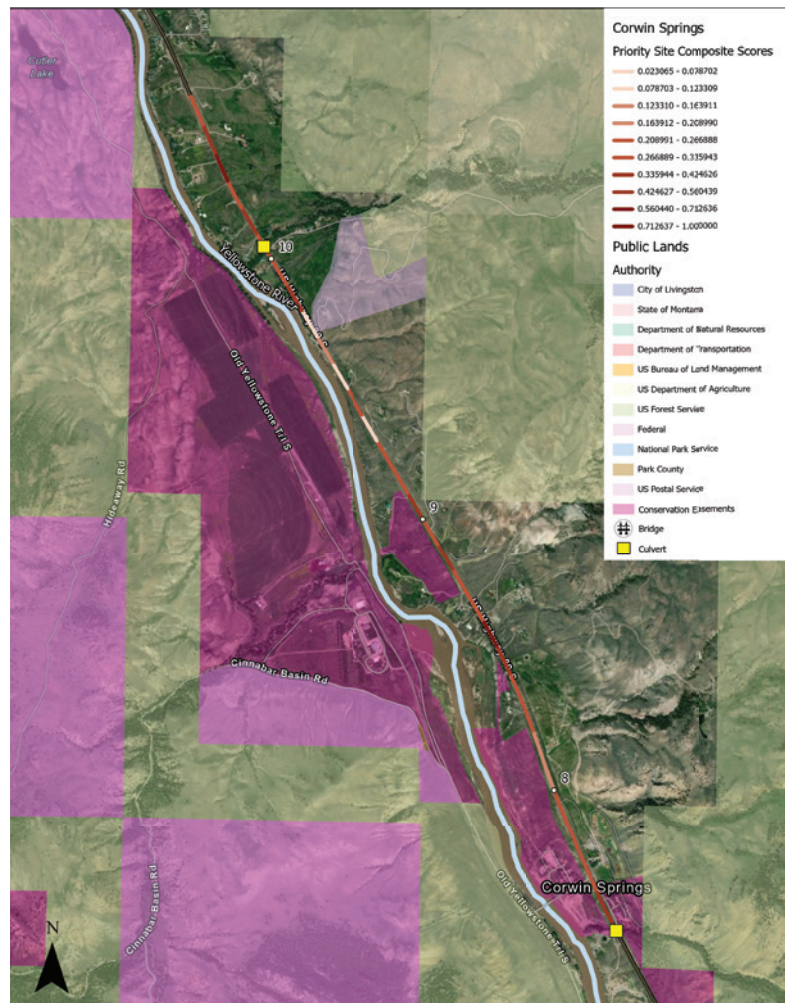
AVERAGE DAILY TRAFFIC: 2,853

CARCASS DATA: CORWIN SPRINGS (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
95	2	24	1	1	2	4	3	3	0	0	0	135

The Corwin Springs site is located between Gardiner and Yankee Jim Canyon and has had 33 crashes with wildlife reported to law enforcement from 2012-2021. In addition, there have been 135 wildlife carcasses recorded, primarily mule deer and elk, as well as a grizzly bear, a bison, and two mountain lions, among other species. There are two existing structures at this priority site that accommodate water flows from Bassett (RM 7.5) and Cedar (RM 10) Creeks but do not provide dry passage for most terrestrial wildlife. Cedar Creek is a large tributary of the Yellowstone River flowing out of the Absaroka Mountains and is an important movement corridor for wildlife. Most of this section of highway has private land parcels on either one or both sides of the highway, which may need to be conserved with easements for a project to move forward at this site.

RECOMMENDATIONS:

- Replace the two existing culverts with larger structures, preferably span bridges that span beyond the stream banks to allow for riparian habitat and dry pathways for wildlife.
- In the area around RM 7.7 the road is built upon fill that could provide an opportunity to construct a new wildlife underpass such as a large culvert or span bridge.
- In addition to the structure(s), fencing will be needed to keep wildlife off the highway, reduce WVCs, and guide animals toward safe crossing opportunities. The fence ends and access roads will need treatments to keep animals from entering the fenced corridor and to warn drivers of animals that may cross the road at the fence ends.



PRIORITY SITE: DOME MOUNTAIN

US-89 ROAD MILE (RM): 17.1 - 22.4

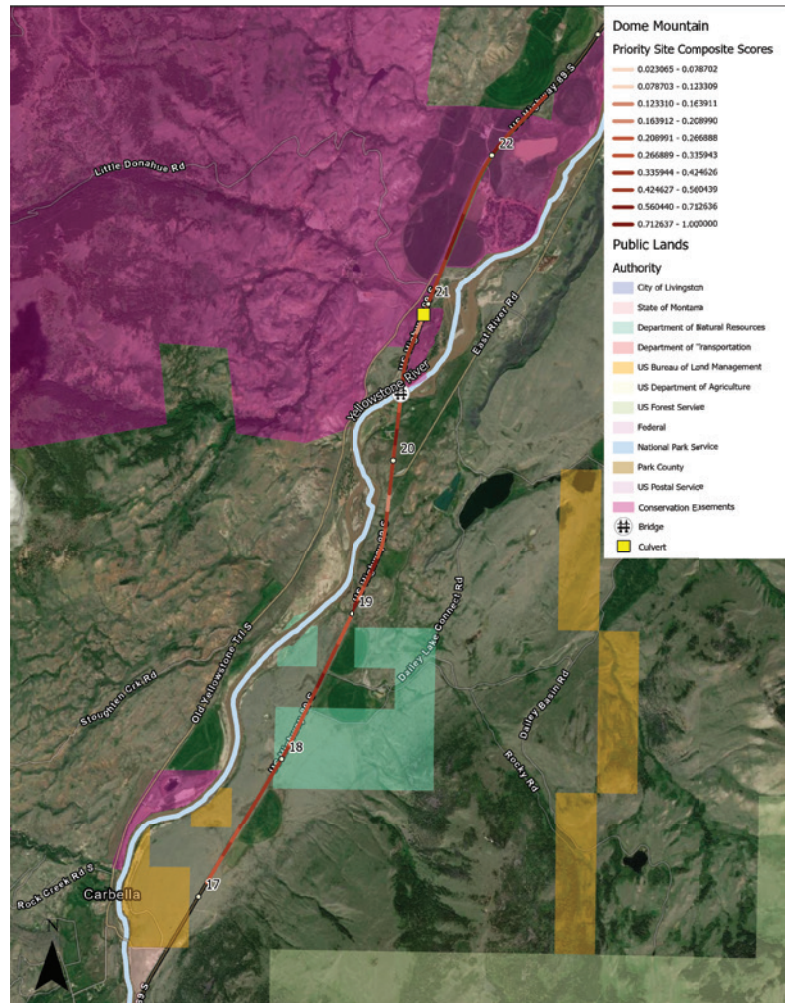
AVERAGE DAILY TRAFFIC: 1,547

CARCASS DATA: DOME MOUNTAIN (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
30	9	64	1	0	1	3	8	10	23	0	0	149

The Dome Mountain Priority Site runs from the Carbella Fishing Access Site to north of East River Road. This site has had 74 crashes with wildlife reported to law enforcement from 2012-2021. In addition, there have been 149 carcasses recorded, primarily elk and mule deer along with one grizzly bear. This area is located in an important current and historical movement corridor for wildlife and is adjacent to the Dome Mountain Wildlife Management Area. Animals here frequently move back and forth across the highway to access the Yellowstone River, forage opportunities, upland habitat, and cover. There are two existing structures within this priority area, including the bridge at Point of Rocks and a small culvert at Donahue Creek. Steep rip rap prevents wildlife movement beneath the bridge on the north bank.

RECOMMENDATIONS:

- There are three potential locations for new wildlife crossing structures: two overpasses around RM 19.5 and RM 18, and an overpass or a large underpass around RM 21.5. The RM 19.5 location would require voluntary land conservation efforts to move forward.
- Potential to replace the Point of Rocks bridge and Donahue Creek culvert with larger structures to accommodate the floodplain and provide safe passage for wildlife.
- In addition to the structure(s), fencing will be needed to keep wildlife off the highway, reduce WVCs, and guide animals toward safe crossing opportunities. The fence ends and access roads will need treatments to keep animals from entering the fenced corridor and to warn drivers of animals that may cross the road at the fence ends.



PRIORITY SITE: MERRIMAN

US-89 ROAD MILE (RM): 25.9 - 29.3

AVERAGE DAILY TRAFFIC: 1,547

CARCASS DATA: MERRIMAN (2012-2021)

MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	MOOSE	TOTAL
51	73	8	1	0	0	1	4	24	9	1	0	1	173

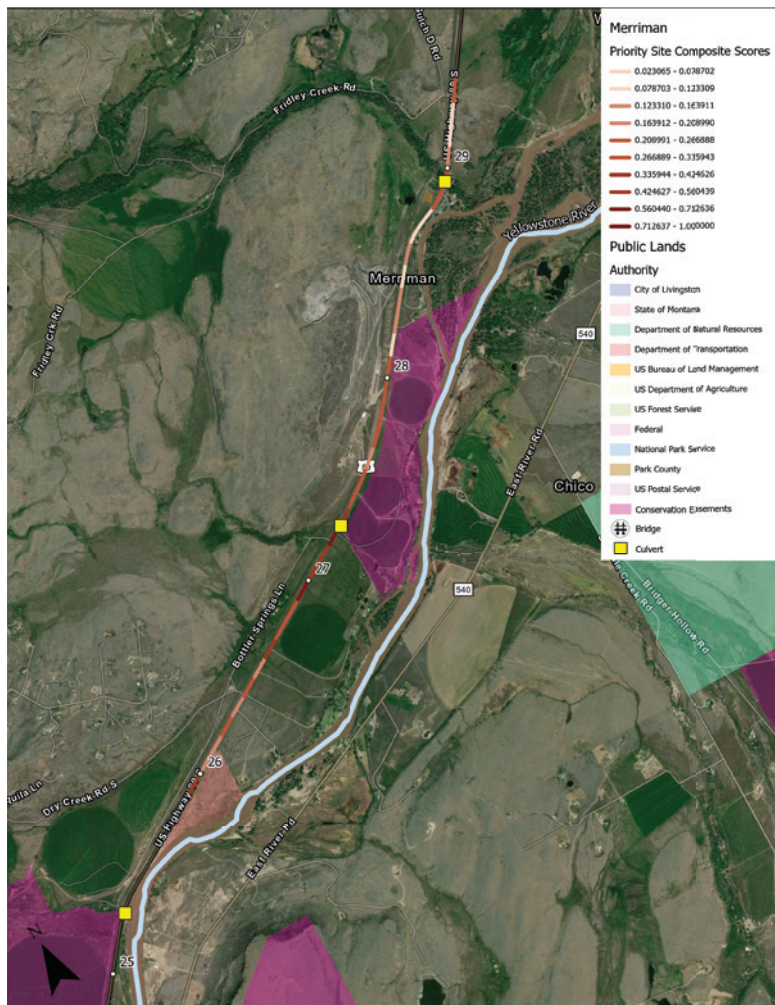
The Merriman Priority Site is located just a couple miles south of the town of Emigrant. This site had 55 crashes with wildlife reported to law enforcement from 2012-2021. In addition, 173 wildlife carcasses have been recorded, mostly white-tailed and mule deer. This site also has the only moose carcass recorded in the study area during this time period. While wildlife accommodation options are somewhat limited at this site, there are a few small, existing structures here that could be upgraded to accommodate movement by some species, including culverts at Dry and Fridley Creeks and a small stockpass.

RECOMMENDATIONS:

- There is one location where an overpass may be feasible in the area around RM 27, which had some of the highest WVC and Composite scores within the site. This location would require voluntary land conservation efforts to move forward.

- There is a location at RM26 that could be considered for future underpass or culvert projects. The site has private land to the west side of the road that is protected with conservation easements, and state-owned property on the east side of the road.

- In addition to the structure(s), fencing will be needed to keep wildlife off the highway, reduce WVCs, and guide animals toward safe crossing opportunities. The fence ends and access roads will need treatments to keep animals from entering the fenced corridor and to warn drivers of animals that may cross the road at the fence ends.



PRIORITY SITE: MILL CREEK

US-89 ROAD MILE (RM): 34.0 - 37.0

AVERAGE DAILY TRAFFIC: 2,911

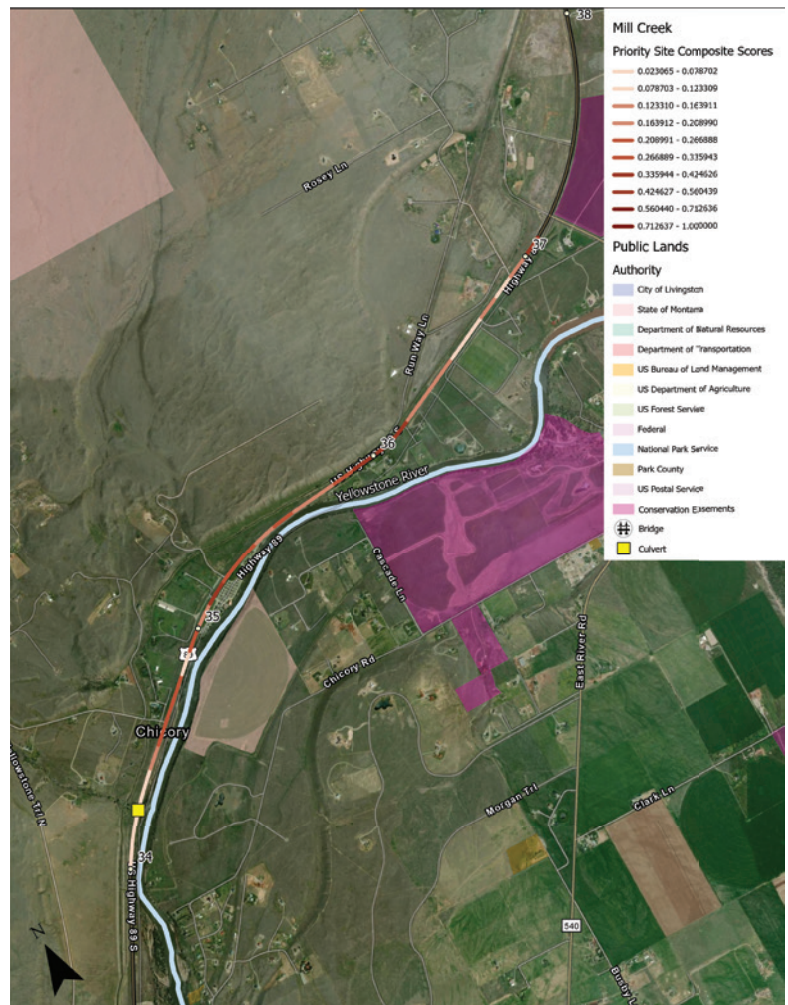
CARCASS DATA: MILL CREEK (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
46	74	5	0	0	0	0	15	6	3	5	0	154

The Mill Creek Priority Site is located a few miles north of the town of Emigrant and was identified primarily due to WVC risk with deer. This site has had 36 wildlife-related crashes reported to law enforcement from 2012-2021. There have also been 118 carcasses recorded, comprised primarily of white-tailed and mule deer. There is one existing large culvert at Eightmile Creek (RM 34), though it currently does not provide a safe passage opportunity for terrestrial wildlife. The culvert also acts as a barrier to fish passage. The land just east of the Eightmile Creek culvert is public and includes the Grey Owl Fishing Access Site.

RECOMMENDATIONS:

- Replace the existing culvert at Eightmile Creek with a span bridge to provide riparian habitat and fish passage, as well as allow for safe dry passage suitable for large wildlife beneath the road. This could be combined with removing nonfunctional barbed wired fencing adjacent to the Grey Owl Fishing Access Site, and stream and riparian restoration. This upgraded structure would also need to be combined with wildlife-proof fencing and associated measures.

- To reduce WVCs in their most prevalent area around RM 36 wildlife-proof fencing in combination with animal detection systems could provide an improved crossing location through an “at-grade” crosswalk where drivers would be warned if an animal was approaching the highway.



PRIORITY SITE: PINE CREEK

US-89 ROAD MILE (RM): 43.2 - 47.0

AVERAGE DAILY TRAFFIC: 3,271

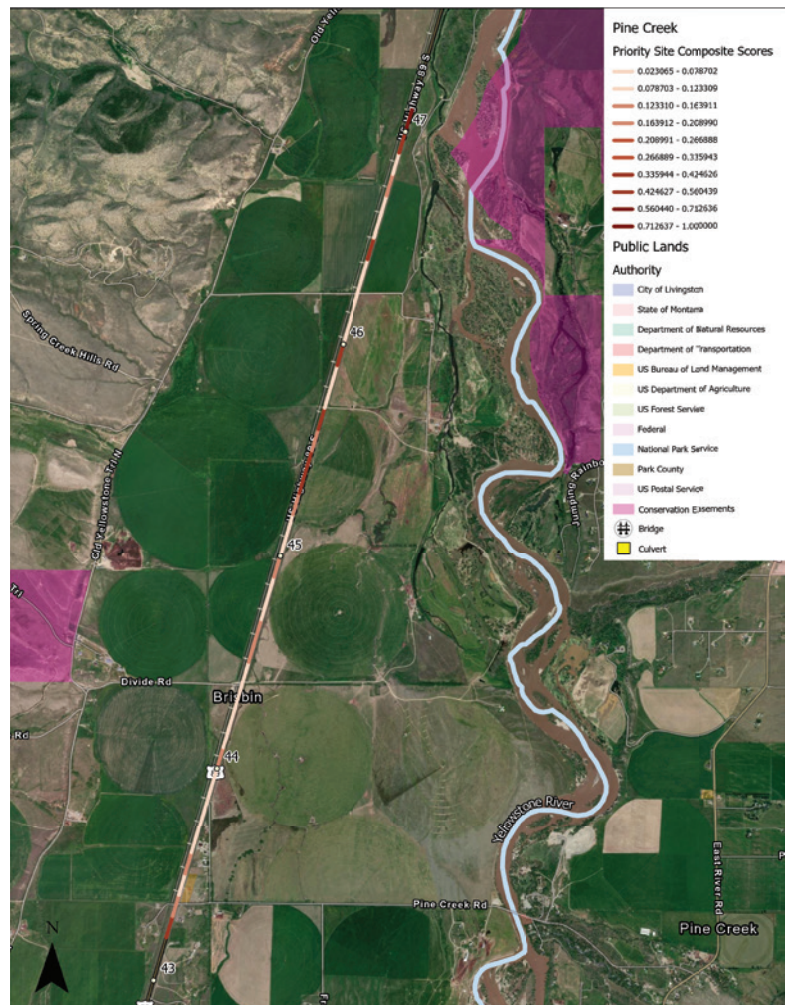
CARCASS DATA: PINE CREEK (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
18	93	1	0	0	0	0	12	13	7	0	0	144

The Pine Creek Priority Site is in an open, relatively flat area surrounded by irrigated agriculture on private land. This site has had 49 crashes with wildlife reported to law enforcement from 2012-2021. This site has also had 144 carcasses recorded, consisting primarily of white-tailed deer. There is one existing culvert at RM 42.2, but there is only ~4ft of vertical clearance and no dry passage for terrestrial species. This entire stretch of highway is fairly level with the surrounding landscape limiting the potential to construct underpasses for wildlife.

RECOMMENDATIONS:

- To improve the culvert or provide new underpass structures for wildlife, such as deer, the entire roadbed would need to be built up substantially. While this is possible, it would be very costly, and the site is not located in an area where connectivity for wildlife is as high of a concern as in other locations. There are many access roads and driveways along this stretch of highway, which complicates the potential to deploy wildlife-proof fencing and animal detection systems.

- One recommendation for wildlife movement in the area is to update the right-of-way fence to be wildlife friendly, as deer are frequently moving back and forth across the highway, though this would not reduce the risk of WVCs.



PRIORITY SITE: LIVINGSTON SOUTH

US-89 ROAD MILE (RM): 48.0 - 52.4

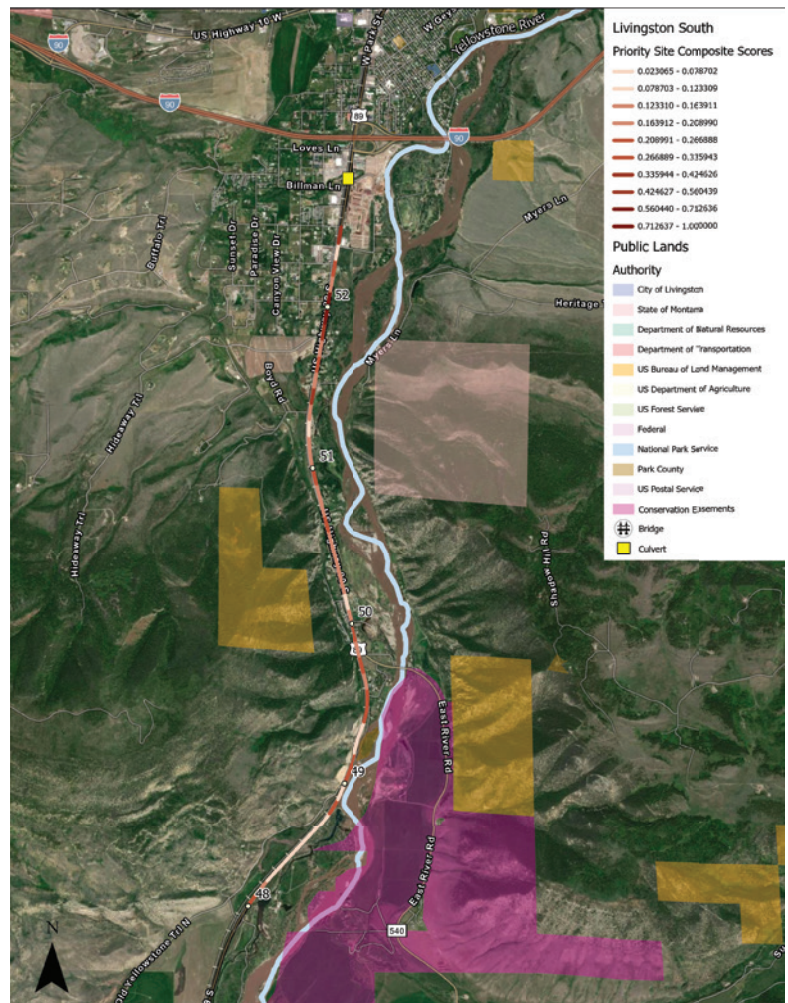
AVERAGE DAILY TRAFFIC: 4,679

CARCASS DATA: PINE CREEK (2012-2021)												
MULE DEER	WHITE-TAILED DEER	ELK	GRIZZLY BEAR	BISON	MOUNTAIN LION	COYOTE	OTHER	UNKNOWN DEER	STRIPED SKUNK	RED FOX	BLACK BEAR	TOTAL
18	245	1	0	0	0	0	6	3	8	2	2	285

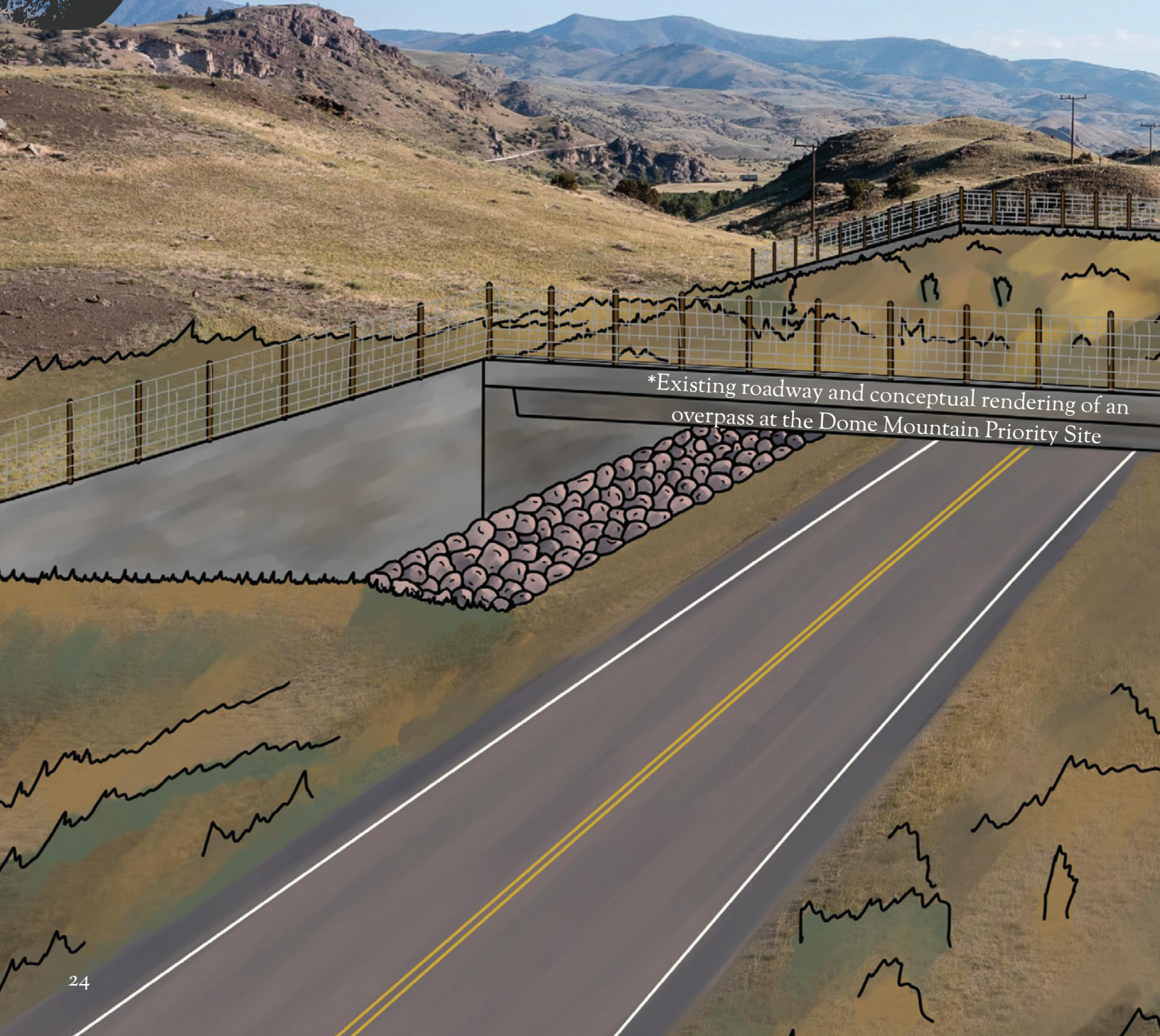
The Livingston South priority area is located on the southern end of the city of Livingston and extends south through the Allenspur Canyon. The canyon area has high connectivity value for many wildlife species, where the Wineglass hills come down close to the road and the Yellowstone River on the west side of the canyon and where the Absaroka Mountains rise up from the east side of the river. The northern portion of this priority site is complex, as it has businesses on the sides of the road and many access roads and driveways. This site also has higher traffic volumes than the rest of the sites due to its proximity to Livingston. There have been 35 wildlife-related crashes at this site from 2012-2021. There have also been 285 wildlife carcasses recorded, consisting mainly of deer in the northern portion and includes more diverse species further south in the canyon area.

RECOMMENDATIONS:

- For the area of biggest WVC concern in terms of numbers, around RM 52, an animal detection system, potentially combined with fencing, may be the only feasible option to reduce WVCs.
- In the area with high connectivity value between the Wineglass hills and the Absaroka Mountains (RM 48-51), there are locations where the road is built up on fill that may provide opportunity for underpasses, like span bridges, to be built to allow for safe wildlife passage beneath the road.
- These underpasses could be connected by wildlife-proof fencing and associated measures where appropriate and potentially be integrated into the animal detection system further north.



LOOKING AHEAD



*Existing roadway and conceptual rendering of an overpass at the Dome Mountain Priority Site

Making US 89 safer for locals, visitors, and Yellowstone's wildlife is a multi-year, multi-site proposition that will take collective action to bring about. In the end, a variety of measures enacted over time will help to improve human travel and maintain wildlife movement in the Upper Yellowstone.

Together with elected officials and public agencies, area communities will determine how to move the recommendations of the US 89 Wildlife and Transportation Assessment forward.



OUR GRATITUDE



FUNDERS: AMB West Conservation Fund, Greater Yellowstone Coalition, Weeden Foundation.

ORGANIZATIONS: Ecoflight, Federal Highway Administration, Greater Yellowstone Coalition, Interagency Grizzly Bear Study Team, Montana Department of Transportation, Montana Fish, Wildlife and Parks, Montana Freshwater Partners, National Parks Conservation Association, Park County Environmental Council, The Common Ground Project, U.S. Fish and Wildlife Service, U.S. Forest Service, Yellowstone National Park.

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YELLOWSTONE SAFE PASSAGES

TO READ THE ASSESSMENT'S FULL REPORT, VISIT
WWW.YELLOWSTONESAFEPASSAGES.ORG/HIGHWAY-ASSESSMENT

SOURCES

^a MDT. 2014. Paradise Valley Corridor Planning Study.

^b MSU-WTI. 2023. Unpublished.

^c State Farm Insurance. 2023.

^d National Park Service. 2022. NPS Statistics (IRMA)

^e Huijser, M., J. Duffield, C. Neher, A. Clevenger, and T. McGuire. 2022. "Update and Expansion of the WVC Mitigation Measures and Their Cost-Benefit Model."

^f Huijser, M.P., Ament, R.J., Bell, M., Clevenger, A.P., Fairbank, E.R., Gunson, K.E., and T. McGuire. 2021. "Animal Vehicle Collision Reduction and Habitat Connectivity Pooled Fund Study – Literature Review." Nevada Department of Transportation. Report No. 701-18-803

^g Huijser, M. P., Mosler-Berger, C., Olsson, M., & Strein, M. (2015). Wildlife warning signs and animal detection systems aimed at reducing wildlife-vehicle collisions. Handbook of road ecology, 198-212.

