

US-191/MT-64 Wildlife & Transportation Assessment

KEY FINDINGS

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Overview

The **US-191/MT-64 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.

These key findings highlight critical considerations for two major roads that unite local communities yet divide the landscape in one of southwest Montana’s “Gateways to Yellowstone.” Included are the Wildlife & Transportation Assessment’s methods, priority sites for mitigation, and recommendations for future action.

Why Do We Need an Assessment?

Residents, Commuters, and Visitors Depend on these Roads:



- Traffic volume along US-191* increased by 38% from 2010-2018.^a
- 83% of Big Sky workers regularly commute along US-191 and MT-64 (Lone Mountain Trail).^b
- Visitation to Yellowstone National Park increased by 20% from 2014-2017 and over 1 million trips on US-191 are made to enter the park. The town of West Yellowstone hosts more than 4 million visitors per year.^c

More Traffic is a Problem for Wildlife:



- Grizzly bears, among other species, are sensitive to traffic, losing road crossing opportunities as traffic levels increase.^d
- Traffic on US-191 and MT-64 is already at a level that has been shown to reduce deer crossing safety.^e

The Status Quo is Risky and Expensive:



- Collisions involving wildlife make up 24% of all reported crashes on US-191 and over 13% on MT-64.^{a,b} Across Montana, the statewide average is 10%, while the national average is 5%.^{f,g}
- 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.^h

* From Four Corners (about 8 miles west of Bozeman) to Beaver Creek (just south of Big Sky).

Wildlife-Vehicle Collisions: Costs to Society

Cost of Collisions

From 2011 to 2020 on US-191 (between West Yellowstone and Four Corners, Montana) and along MT-64 (Lone Mountain Trail) into Big Sky, Montana:



1,322

- **1,322 animal carcasses were documented by the Montana Department of Transportation and Interagency Grizzly Bear Study Team.**

These losses amount to:

- **\$27 million*** in personal injury and property damage;
- **\$60 million*** if the intrinsic value of wildlife—which considers the ability of species to remain on the landscape—is included.

*These figures include costs for all documented roadkill: deer, elk, moose, bighorn sheep, wolves, black and grizzly bears, and bison.

Average Cost per Collision by Speciesⁱ



Direct Costs: vehicle repair, human injuries, and human fatalities



Passive Benefit: the value humans place on the existence of an animal species

Deer	 $\$14,014$ $+$ $\$5,075$	 $=$	$\$19,089$
Elk	 $\$45,445$ $+$ $\$27,751$	 $=$	$\$73,196$
Moose	 $\$82,646$ $+$ $\$27,751$	 $=$	$\$110,397$

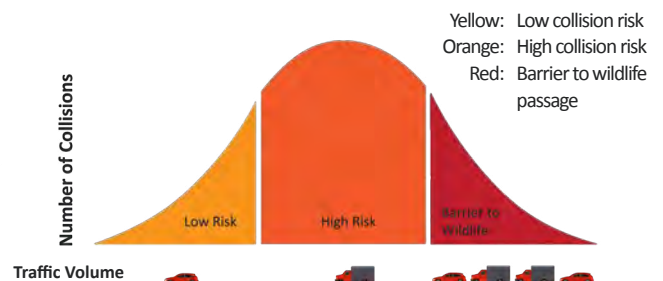
Busy Roads as Barriers to Wildlife

Traffic Volume and the Barrier Effect^l

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



Photo of vehicle by Holly Pippel



Mitigation Measures and their Effectiveness

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 a road and traffic by fencing while enabling safe wildlife passage via dedicated structures achieves the dual objectives of reducing wildlife-vehicle collisions and maintaining habitat connectivity.



Mitigation Measure Effectiveness in Reducing Wildlife-Vehicle Collisions and Maintaining Connectivity^k

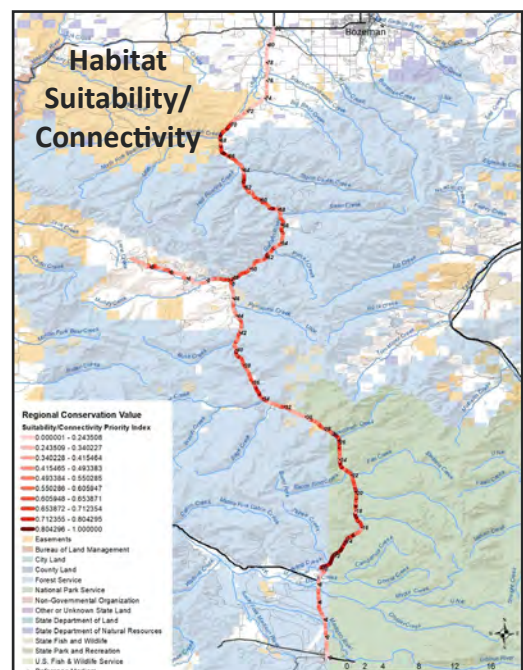
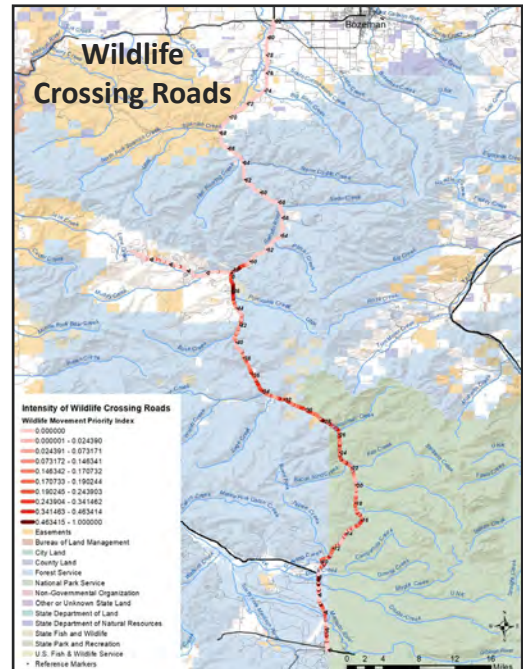
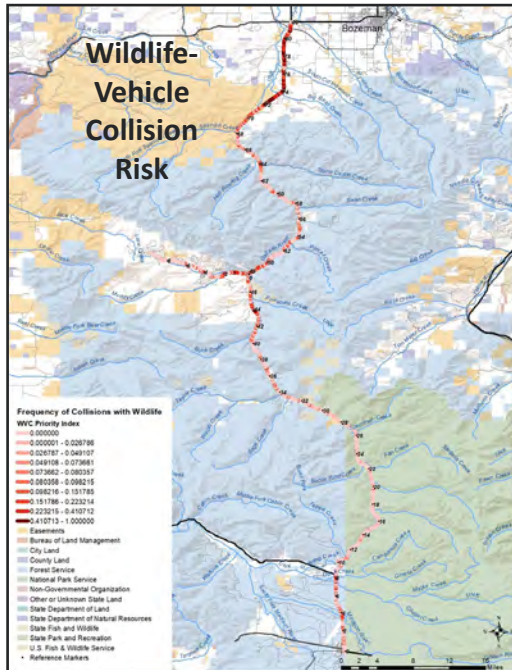
Mitigation Measure		Effectiveness in Reducing Collisions	Effectiveness in Maintaining Connectivity
<i>Measures aimed at influencing driver behavior</i>			
Seasonal wildlife warning signs		9 - 50% (highly variable)	None
Roadside animal detection systems		33 - 97% (highly variable)	None
Traffic-calming measures and reduced speed limit*		Up to 60%	Unknown (may increase)
<i>Measures to separate wildlife from the road and traffic</i>			
Wildlife crossing structures with fencing		80 - 100%	Maintains habitat connectivity

*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.^l



Priority Sites and Recommendations: Our Methods

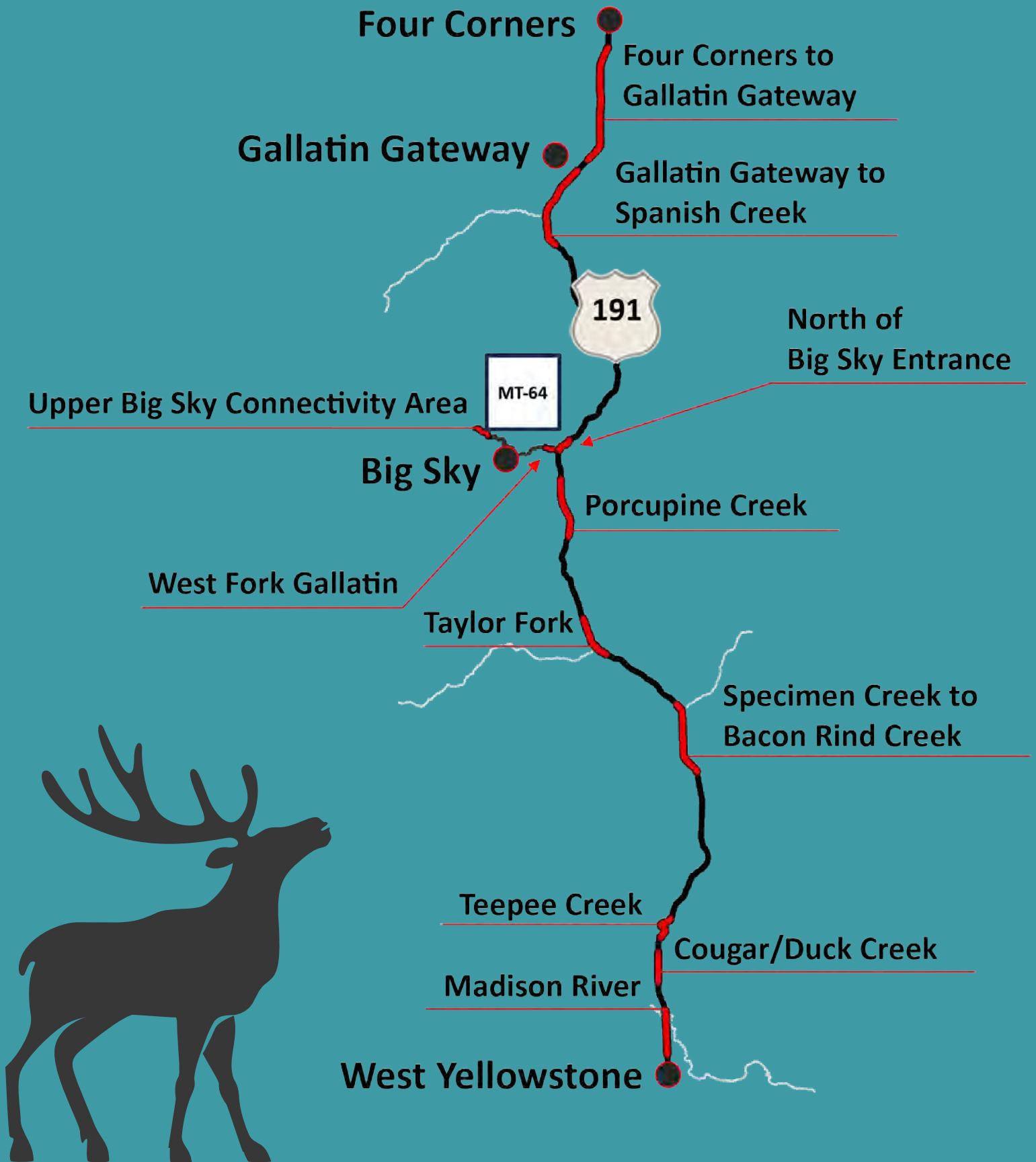
Through data analysis and site visits with an interdisciplinary team, the Assessment identified 11 priority locations that are potential barriers to wildlife movement and pose elevated risks to human and wildlife safety. The analysis grouped 25 data sets (including GPS-collared animals, aerial surveys, wildlife-vehicle collisions, wildlife carcasses and habitat) from public sources and citizen science observations into four Prioritization Characteristics: Wildlife-Vehicle Collision Risk, Wildlife Observations Near Roads, Wildlife Crossing Roads, and Habitat Suitability. Habitat information covered species from elk and grizzly bears to bighorn sheep to wolverine and boreal toads. For each Prioritization Characteristic, an index value was developed (on a scale of 0-1, with 1=highest priority and 0=least priority) for every 0.1-mile road segment. These scores were combined into a composite value. Then, road areas with consistently high values were identified for field examination.



At each location, the team of independent researchers and experts from federal, state, and county agencies considered additional attributes—land security, local conservation value, mitigation options, barrier effect, and vulnerability to lane, speed or traffic changes—to determine the final Priority Sites and recommendations.

Priority Site Map

 = Priority Sites



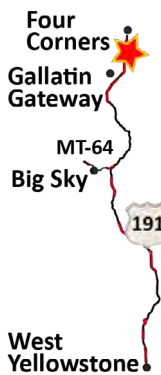
Priority Sites

Four Corners to Gallatin Gateway

US-191: Mile Post: 74.1-81-3

Average Daily Traffic: 14,607

Extent: 7.2 miles



Bordered by homes and businesses, this site has high wildlife-vehicle collision risk and very high traffic volume in an area of increasing development. The presence of many secondary roads, access roads, and driveways—along with lack of land use planning—limits the potential for mitigation measures to reduce collision risk and maintain habitat connectivity. Traffic volume is nearing the threshold at which roads may serve as complete barriers to wildlife (average daily traffic > 15,000 vehicles).^e As a result, fewer animals will attempt cross the road, and those that do will face an elevated collision risk.

Recommendations:

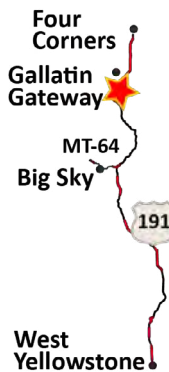
- Consider use of seasonal warning signs, which may marginally reduce collisions.
- Consider the potential of alternative modes of transportation, such as ride sharing, and elements of intelligent transportation systems (e.g., timed traffic signal controls and warning signs). These may also marginally reduce collisions.
- Evaluate the South Cottonwood Creek culvert for the addition of a dry shelf to accommodate small- to medium-bodied terrestrial wildlife, even during higher flows.

Gallatin Gateway to Spanish Creek

US-191: Mile Post: 68.1-73.7

Average Daily Traffic: 10,047

Extent: 5.6 miles



At this site, high wildlife-vehicle collision risk and high traffic volume occur in a landscape of mixed agricultural and residential land uses (to the north), and larger upland parcels that lead to the Custer Gallatin National Forest along the mouth of the Gallatin Canyon (to the south).

Recommendations:

- Retrofit the bridge over the Gallatin River to accommodate large mammals by developing pathways beneath that offer secure footing and sufficient vertical clearance as an interim measure until replacement by an enlarged structure designed for safe wildlife passage; construct fencing to keep wildlife off the road and guide them to the structure.
- Replace the Spanish Creek Bridge with a structure that spans the entire riparian area, has sufficient height (> 15 ft) to allow suitable dry passage beneath for large mammals year-round, and includes fencing to keep wildlife off the road and guide them to the structure.
- Have land trusts explore the potential for land security through voluntary conservation easements with landowners in the vicinity of Mile Posts 70.5-73; examine the engineering feasibility of an overpass with fencing.
- If the measures are implemented, evaluate connecting the structures via fencing and upsizing an existing culvert to better accommodate small- to medium-bodied terrestrial wildlife and aquatic species.

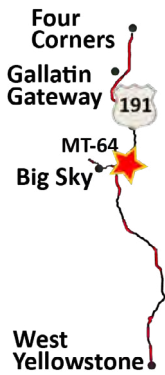
Priority Sites

North of Big Sky Entrance

US-191: Mile Post: 48.1-49.4

Average Daily Traffic: 8,421

Extent: 1.3 miles



With elevated traffic volume, this area has a growing risk of wildlife-vehicle collisions and is becoming a barrier to wildlife movement. Elk frequently cross the highway along each of the 0.10-mile segments within the site—bordered by parcels that lead to the Custer Gallatin National Forest and Lee Metcalf Wilderness Area—and bighorn sheep are often observed along the road. Both species are documented in wildlife-vehicle collisions.

Recommendations:

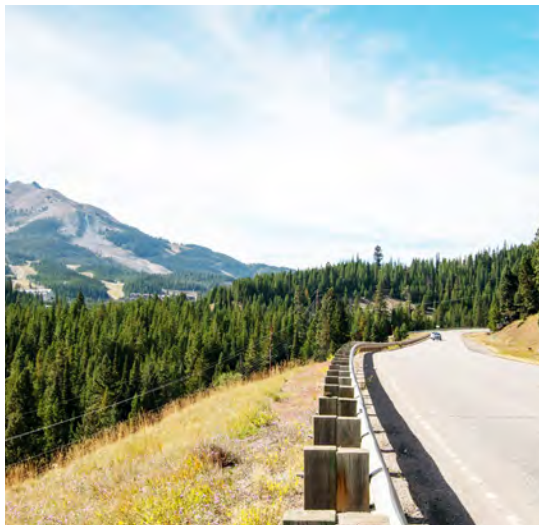
- Retrofit the Jack Smith Bridge over the Gallatin River to accommodate large mammals by developing a pathway that offers secure footing beneath. This would serve as an interim measure until replacement by an enlarged structure designed for safe wildlife passage.
- Have land trusts explore the potential for land security through voluntary conservation easements with landowners west of the road on undeveloped parcels; examine the engineering feasibility of an overpass with fencing, which could connect to the bridge following retrofitting or replacement.

Upper Big Sky Connectivity Area

MT-64: Mile Post: 7.3-8.2

Average Daily Traffic: 2,891

Extent: 0.9 miles



Located on steep slopes at high elevation, the Upper Big Sky Connectivity Area is aptly named for its importance for alpine species, including wolverines. With relatively low traffic and lower-speed travel than other sites, and complex topography and steep roadway grades, no structural measures are recommended at present. However, as development and traffic volume increase, monitoring is recommended to evaluate trends and identify future opportunities to maintain regional connectivity and reduce wildlife-vehicle collisions.

Recommendation:

- Monitor the area for changes in development and traffic pressure, as well as for wildlife-vehicle collisions.

Priority Sites

West Fork Gallatin

MT-64: Mile Post: 0.2-1.2

Average Daily Traffic: 10,513

Extent: 1 mile



At this site located just west of the turn-off onto MT-64 (Lone Mountain Trail) to Big Sky, bighorn sheep frequent the steep slopes of the Custer Gallatin National Forest north of the road, while elk often graze in meadows on the south side. Due to a fairly high traffic volume and the fidelity of these species to preferred habitats on either side of the road, measures to reduce collisions are a primary focus. Two existing structures—a small bridge at Mile Post 0.2 and a culvert at Mile Post 1.1—may allow for passage by species such as black bears, mountain lions, coyotes, bobcats, lynx, and wolverines, but do not have sufficient clearance for passage by elk or other large mammals.

Recommendations:

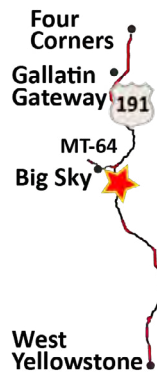
- Evaluate a combination of animal detection systems, traffic-calming measures (e.g., roundabouts or other physical changes), and exclusionary fencing between existing structures to reduce wildlife-vehicle collisions.
- Replace the culvert at Mile Post 1.1 with a larger structure or a span bridge suitable for passage beneath by a wider range of species, including deer and black bears.

Porcupine Creek

US-191: Mile Post: 43.0-47.0

Average Daily Traffic: 7,348

Extent: 4 miles



Bordered by the Gallatin Wildlife Management Area and the Custer Gallatin National Forest, this site hosts high concentrations of elk and other wildlife year-round, with Porcupine and Beaver Creeks serving as major movement corridors between the Gallatin and Madison Ranges.

Recommendations:

- Consider designs for traffic-calming measures such as roundabouts, rumble strips, new pavement markings, or other physical changes to slow traffic and allow posting of lower speed limits. In addition, explore the possibility of motion-activated, nighttime lighting, especially along the more developed extent of the site, from the vicinity of Porcupine Creek to the north.
- Evaluate the Beaver Creek culvert for upsizing to better accommodate small- to medium-bodied terrestrial wildlife, along with aquatic species.
- Have land trusts explore the potential for land security through voluntary conservation easements with landowners west of the road (in the less developed southern extent of the site); examine the engineering feasibility of an overpass with fencing, along with animal detection systems at fence ends.

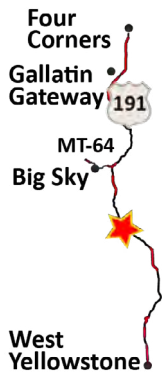
Priority Sites

Taylor Fork

US-191: Mile Post: 34.2-36.4

Average Daily Traffic: 2,239

Extent: 2.2 miles



Primarily surrounded by the Custer Gallatin National Forest, the Taylor Fork is a significant tributary of the Gallatin River that serves as a major movement corridor between the Gallatin and Madison Ranges. Road crossings by elk are documented in each of the fifteen 0.1-mile road segments within the site, with grizzly bear crossings documented in five of the segments. Wildlife-vehicle collisions involving elk, moose, deer, pine martens, and a grizzly bear are also documented.

Recommendations:

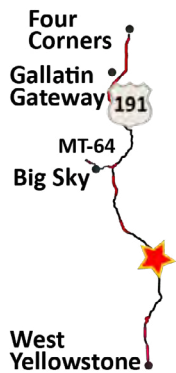
- Replace the Taylor Fork Bridge with a structure that spans the full extent of the riparian area and has sufficient height (> 15 ft) to allow suitable dry passage beneath for large mammals year-round. Evaluate the need for fencing.
- Evaluate the culvert immediately south of Mile Post 36 for upsizing to better accommodate small- to medium-bodied terrestrial wildlife, along with aquatic species.

Specimen Creek to Bacon Rind Creek

US-191: Mile Post: 23.2-27.1

Average Daily Traffic: 2,509

Extent: 3.9 miles



Encompassed within Yellowstone National Park, this site is characterized by open riparian meadows along the roadside rising to forested slopes, including the Lee Metcalf Wilderness Area to the west. Frequent road crossings by elk and grizzly bears are documented, along with wildlife-vehicle collisions involving elk, moose, deer, bighorn sheep, black bears, wolves, coyotes, foxes, pine martens, and beavers.

Recommendations:

- Replace the Gallatin River and Specimen Creek Bridges with structures that span the full extent of the riparian area of each water body and have sufficient height (> 15 ft) to allow suitable dry passage beneath for large mammals year-round.
- Evaluate five existing culverts for upsizing for use by aquatic and small- to medium-sized terrestrial wildlife.
- Consider connecting the upgraded structures together via fencing to reduce wildlife-vehicle collisions and to guide wildlife. A possible alternative may be an animal detection system(s).
- Examine the potential for management of the highway as a “park road” rather than throughway, including night closure to semi-trucks.

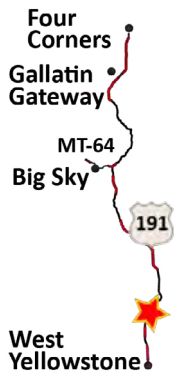
Priority Sites

Teepee Creek

US-191: Mile Post: 9.5-11.6

Average Daily Traffic: 2,509

Extent: 2.1 miles



Connecting Yellowstone National Park and the Custer Gallatin National Forest, this site provides habitat for elk, moose, and grizzly bears, among other species, in a mix of forest, wetland, and riparian areas. As traffic volume increases, measures to maintain habitat connectivity are critical. Wildlife-vehicle collisions with three grizzly bears, plus elk, moose, coyotes, foxes, pine martens, beavers, and porcupines are documented.

Recommendations:

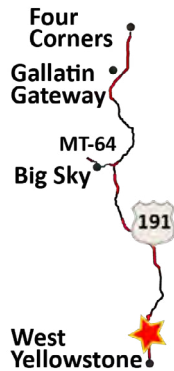
- Replace the Grayling Creek Bridge with a structure that spans the full extent of the riparian area and has sufficient height (> 15 ft) to allow suitable dry passage beneath for large mammals year-round. The adjacent snowmobile bridge would require similar enlargement.
- Replace the double pipe culverts at Teepee Creek with a structure that spans the full extent of the wetland and riparian areas and has sufficient clearance (> 15 ft) to allow large mammals to pass beneath.
- Following these changes, consider connecting the new structures via fencing, which may extend as far south as Fir Ridge.

Cougar/Duck Creek

US-191: Mile Post: 7-9

Average Daily Traffic: 3,257

Extent: 2 miles



Located largely within the Custer Gallatin National Forest in an area of forest and meadows with high wildlife density based on proximity to Yellowstone National Park, the Cougar/Duck Creek site is highly valuable for habitat connectivity for multiple species. A significant number of collisions with bison also occur at the site based on recent data, as well as in a 2012 analysis carried out independently by MSU's Western Transportation Institute.^m

Recommendations:

- Consider options for replacing the existing Cougar Creek Bridge and Duck Creek culvert with structures that span the full extent of the riparian area of each water body and have sufficient height (> 15 ft) to allow suitable dry passage beneath by large mammals year-round. The adjacent snowmobile bridges would require similar enlargement.
- Fencing and fence end treatments such as animal detection systems would also be necessary to direct animals to the structures and to warn drivers of wildlife on the road.

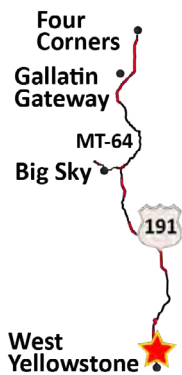
Priority Sites

Madison River

US-191: Mile Post: 9.5-11.6

Average Daily Traffic: 2,509

Extent: 2.1 miles



Ensnoced within lodgepole pine habitat at grade with the road within the Custer Gallatin National Forest, this site is in an area of high use by bison and other species just beyond Yellowstone National Park. A significant number of collisions with bison also occur at the site based on recent data, as well as in a 2012 analysis carried out independently by MSU’s Western Transportation Institute.^m

Recommendations:

- Consider options for replacing the existing Madison River Bridge with a structure that spans the full extent of the riparian area and has sufficient height (> 15 ft) to allow suitable dry passage beneath by large mammals year-round, and/or consider the feasibility of construction of a dedicated overpass.
- Fencing and fence end treatments such as animal detection systems would also be necessary to direct animals to any structure and to warn drivers of wildlife on the road.

Looking Ahead

Making US-191 and MT-64 safer for travelers and 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 improve driver safety and maintain wildlife movement.

Together with elected officials and public agencies, area communities will determine how to move forward with recommendations of the US-191/MT-64 Wildlife & Transportation Assessment.

Sources:

- ^a MDT. 2020. US-191 Corridor Study.
- ^b Gallatin County. 2017. TIGER Proposal.
- ^c National Park Service. 2022. NPS Statistics (IRMA).
- ^d Waller, J. & C. Miller. 2015. Decadal Growth of Traffic Volume on US-2 in Northwestern Montana. *Intermountain Journal of Sciences* 21 (1–4): 29–37.
- ^e Riginos, C., C. Smith, E. Fairbank, E. Hansen, & P. Hallsten. 2018. Traffic Thresholds in Deer Road-Crossing Behavior. WYDOT.
- ^f MSU-WTI. 2023. Unpublished.
- ^g NHTSA-NCSA. 2022. Traffic Safety Facts 2020.
- ^h State Farm Insurance. 2023.
- ⁱ Huijser, M., Duffield J., Neher C., Clevenger A., & T. Mcguire (eds). 2022. Update and Expansion of the WVC Mitigation Measures and their Cost Benefit Model. TPF-5(358). NVDOT.
- ^j Seiler, A. 2003. The Toll of the Automobile – Wildlife and Roads in Sweden. Doctoral Thesis. Swedish University of Agricultural Sciences.
- ^k Huijser, M., Ament, R., Bell, M., Clevenger, A., Fairbank, E., Gunson, K., & T. Mcguire (eds). 2022. Animal Vehicle Collision Reduction and Habitat Connectivity Pooled Fund Study – Literature Review. TPF-5(358). NVDOT.
- ^l Huijser, M., Mosler-Berger, C., Olsson, M., & M. Strein. 2015. Wildlife Warning Signs and Animal Detection Systems Aimed at Reducing Wildlife-Vehicle Collisions. *Handbook of Road Ecology*, 198-212.
- ^m Dupree, A. & I. DiMambro. 2012. Development of Mitigation Options for Bison-Vehicle Collisions on US-191. MSU-WTI.

Thank You to the Assessment's Generous Supporters and Participating Agencies

Sponsors:

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Participating Agencies:

Gallatin County, Montana Department of Transportation, U.S. Forest Service, Interagency Grizzly Bear Study Team, National Park Service, U.S. Fish and Wildlife Service, Federal Highway Administration, and Montana Fish, Wildlife and Parks.

To read the Assessment's full report, visit:

[Largelandscapes.org/191](https://largelandscapes.org/191)

