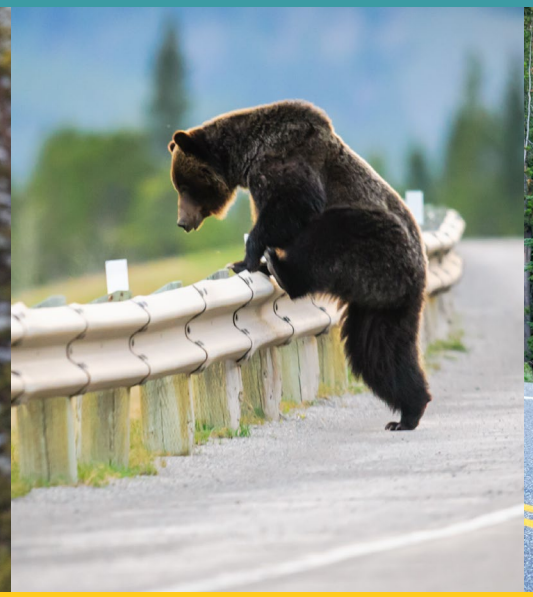
US-191/MT-64 Wildlife & Transportation Assessment



Photo by Matt Ludin



CENTER for LARGE LANDSCAPE CONSERVATION

Elizabeth Fairbank

MONTANA STATE UNIVERSITY
Western Transportation Institute

Why Investigate Wildlife & Transportation on US-191 and MT-64?

Residents, Commuters, and Visitors Depend on these Roads:

- Traffic volume increased by 38% along US-191 from 2010 to 2018.[a]
- Visitation to Yellowstone National Park increased by 20% from 2014-2017[b] Big Sky attracts more than 500,000 skier visits each year.[c]
- 83% of Big Sky workers commute using US-191 and Lone Mountain Trail.[b]

More Traffic is a Problem for Wildlife:

- Grizzly bears, among other species, are sensitive to traffic, losing crossing opportunities as levels increase.[d]
- Traffic volumes measured on US-191 and MT-64 are 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 (Four Corners to Beaver Creek) and over 13% on MT-64.[a,b]
- The average cost of a collision is $14,000 (deer) or $45,000 (elk) in personal injury and property damage.[f]

Sources: [a] MDT US-191 Corridor Study (2020); [b] TIGER Proposal (2017); [c] New York Times (2017); [d] Waller and Miller (2015); [e] Riginos et al. 2018; [f] Huijser et al. (2022)
Photo by Holly Pippel

The US-191/MT-64 Wildlife & Transportation Assessment

Goals:

- Improve knowledge of wildlife movement and road safety along US-191 *(Four Corners to West Yellowstone)* and along Lone Mountain Trail.
- Provide robust information for decision-making on potential measures to improve road safety and ecological connectivity for wildlife.

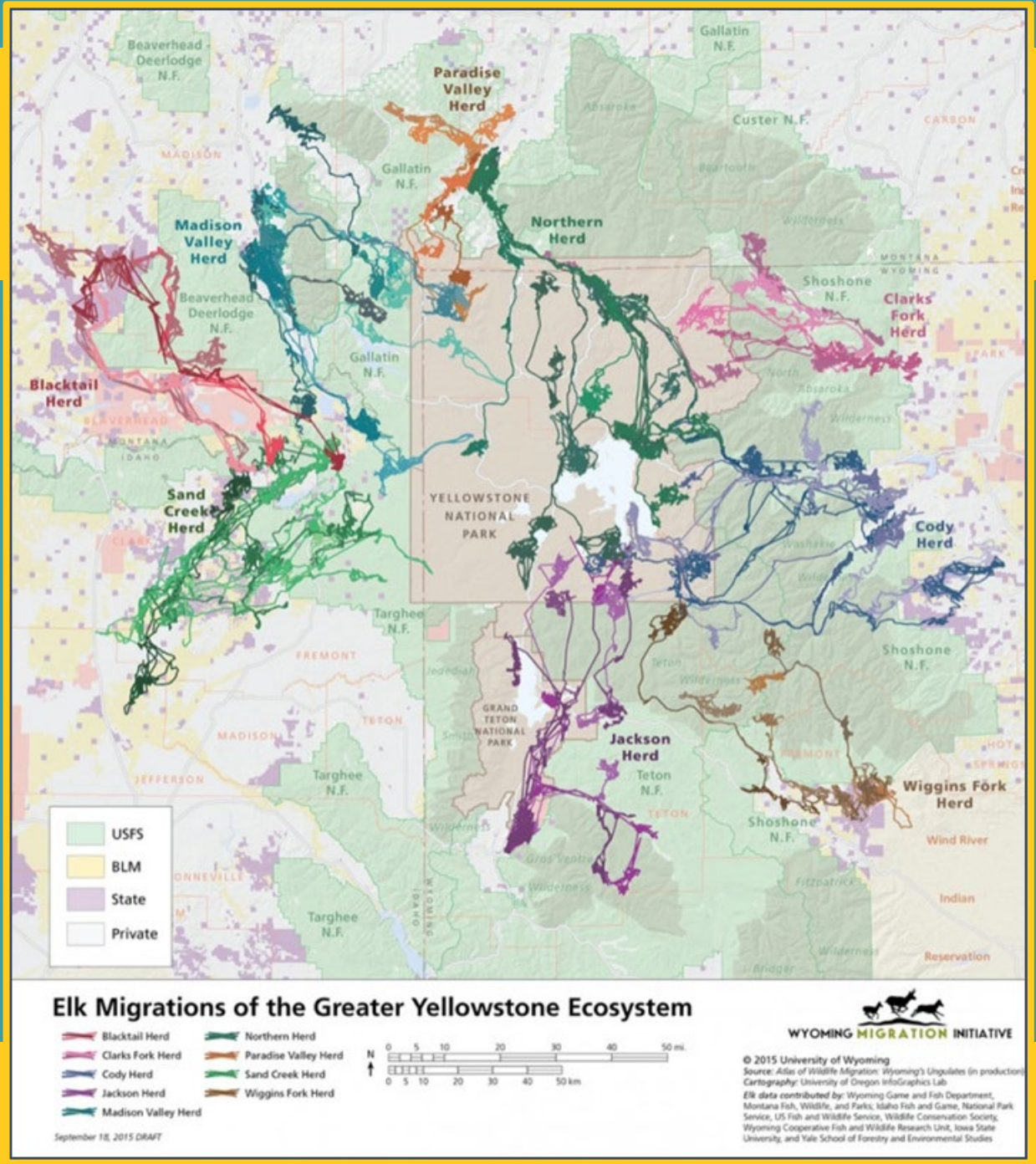
Project implementers:

Center for Large Landscape Conservation

MSU-Western Transportation Institute

Elk Migrations of the Greater Yellowstone Ecosystem

Bull Elk Migrating in Shoshone National Forest. Creative Commons CC BY 2.0 - Travis Zaffarano, Wyoming Migration Initiative/University of Wyoming Cooperative Fish and Wildlife Research Unit



Roads as Barriers to Wildlife & Collision Risk

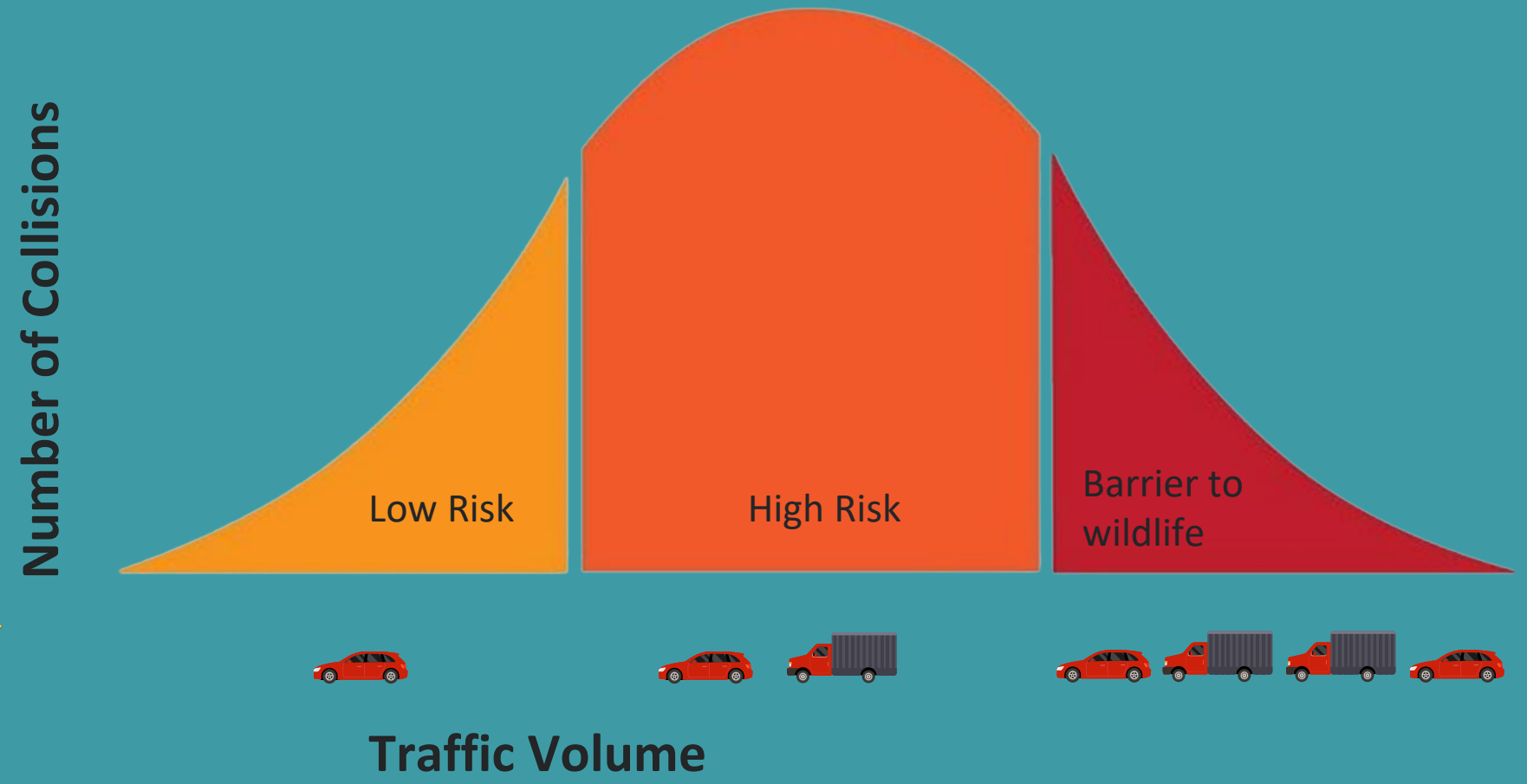


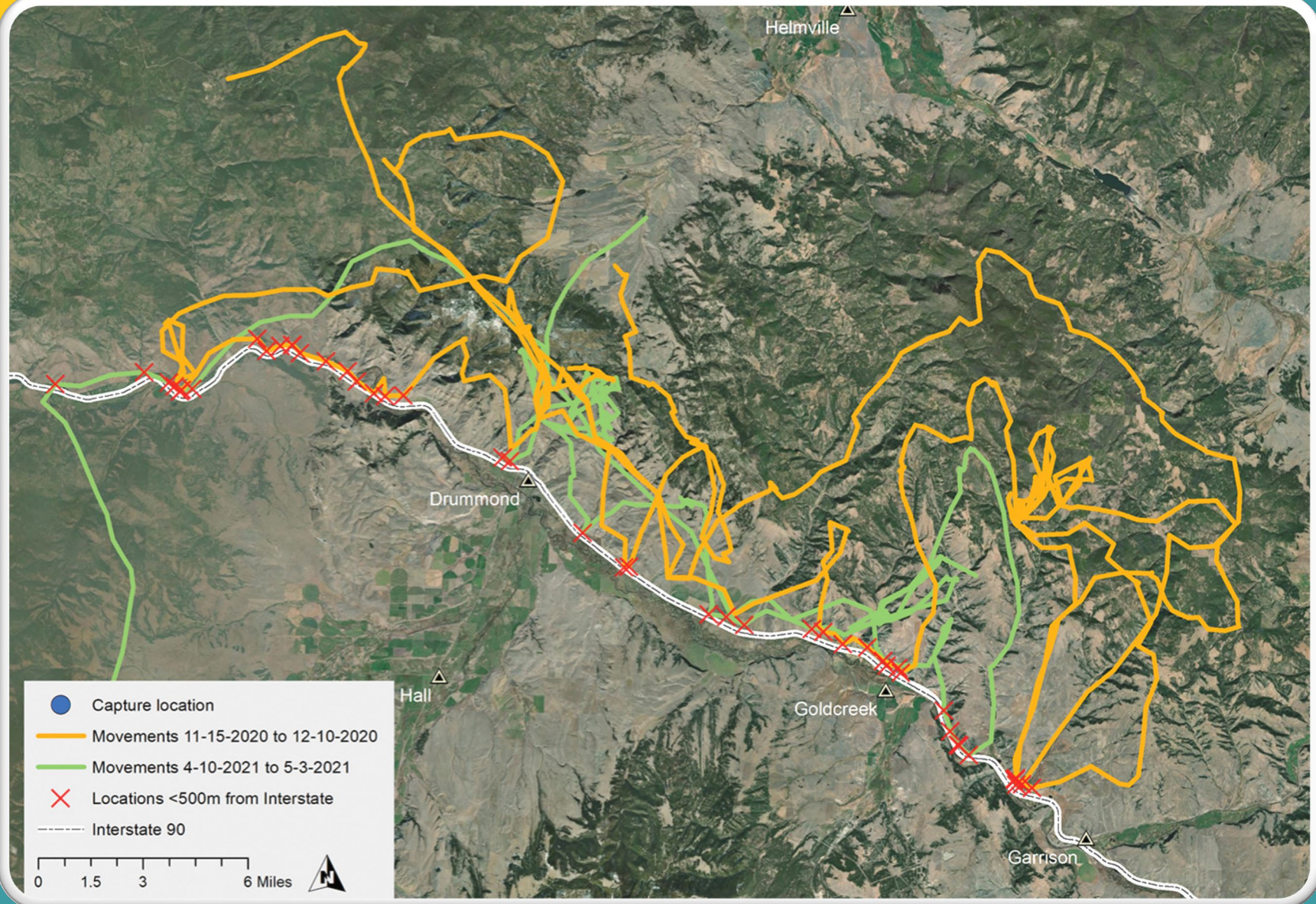
Photo by Holly Pippel

Source: Seiler et al. 2003; Riginos et al. 2019

I-90, Near Drummond, Montana

A grizzly bear's 46 crossing attempts, over 29 days (Fall 2020) & 24 days (Spring 2021)

Source: Montana FWP



Total Cost Associated With Animal-Vehicle Collisions (in 2020 US$)

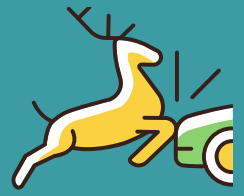
Data Source: Huijser M, Duffield J, Neher C, Clevenger A, & Mcguire T. (eds). 2022. Update and expansion of the WVC Mitigation Measures. TPF-5(358). NVDOT

	Direct Costs	+	Passive Benefit	=	Total Cost per Collision
Deer	$14,014	+	$5,075	=	$19,089
Elk	$45,445	+	$27,751	=	$73,196
Moose	$82,646	+	$27,751	=	$110,397

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

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

Cost of Wildlife-Vehicle Collisions



1,322

Montana Department of Transportation and Interagency Grizzly Bear Study Team documented 1,322 animal carcasses from 2011-2020 in the study area.

Conservative cost estimate > $27 Million (personal injury and property damage).

Or > $60 million if the intrinsic value of lasting wildlife populations is included.

Source: Huijser MP, Duffield JW, Neher C, Clevenger AP, Mcguire T, editors. Final Report 2022: Update and expansion of the WVC mitigation measures and their cost-benefit model. TPF-5(358). Nevada Department of Transportation

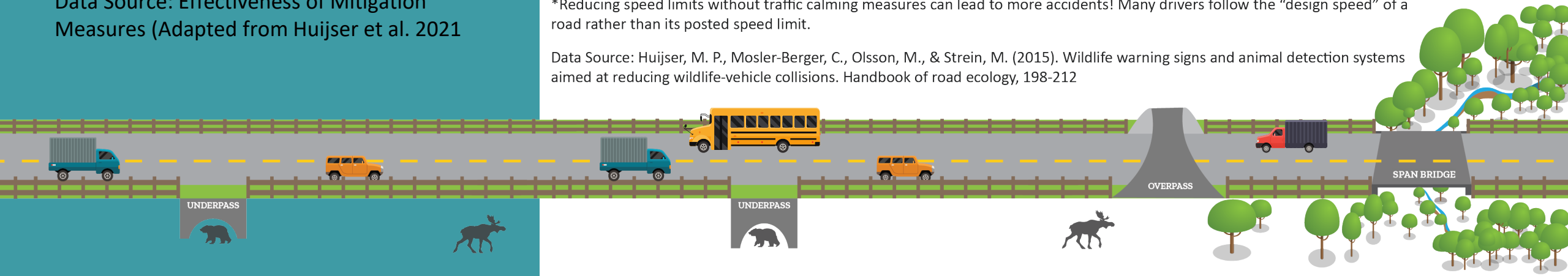
Mitigation Measure Effectiveness in Reducing Wildlife-Vehicle Collisions and Maintaining Connectivity

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

Data Source: Effectiveness of Mitigation Measures (Adapted from Huijser et al. 2021

*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.

Data Source: 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



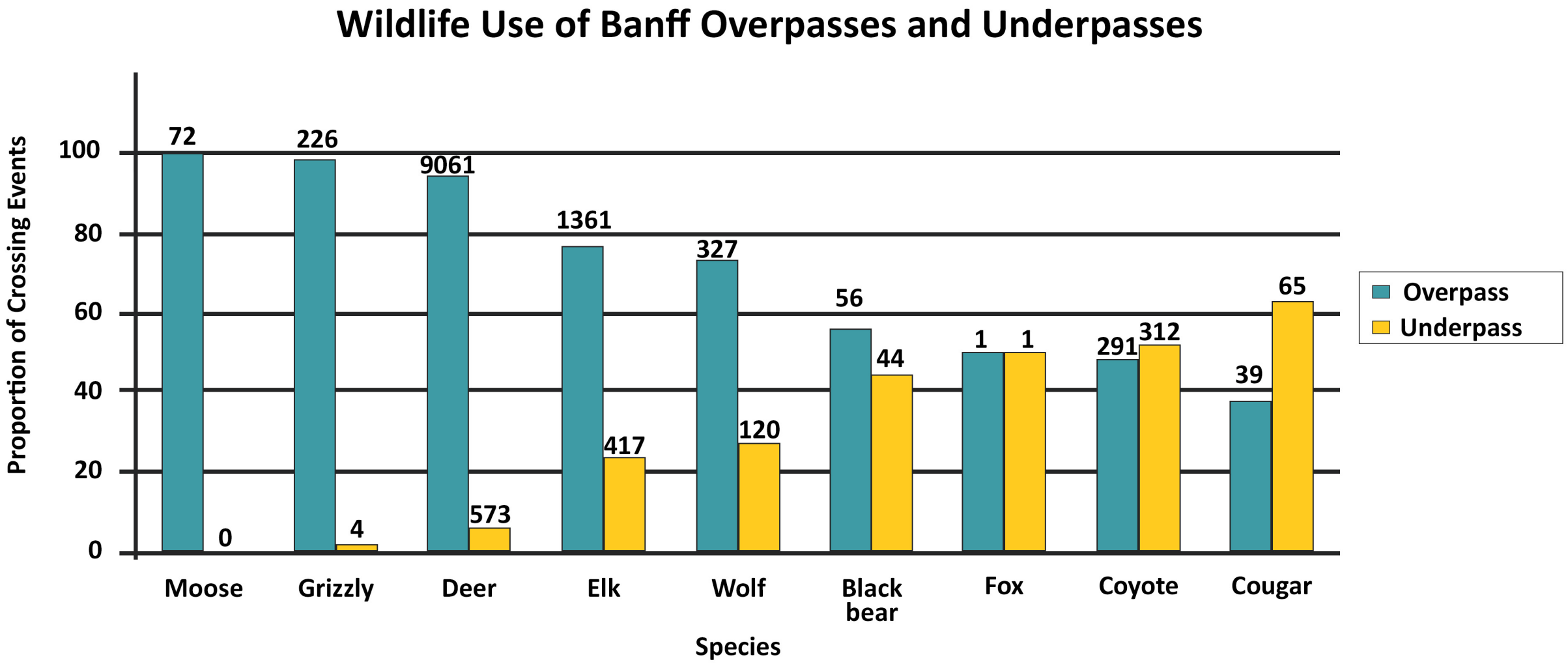
Cost of Mitigation Measures

Structure Type	Minimum	Maximum
Fence, 1 km on both sides of road	$67,648	$198,415
Jump-out (escape ramp)	$5,432	$16,811
Underpass	$253,679	$983,875
Bridge	$2,452,864	$3,731,870
Overpass	$2,243,730	$6,559,168

Data Source: Huijser M, Duffield J, Neher C, Clevenger A, & Mcguire T. (eds). 2022. Update and expansion of the WVC Mitigation Measures and their Cost Benefit Model. TPF-5(358). NVDOT.

Costs vary based on a variety of factors such as topography, soils, and hydrology. These numbers reflect averages from a few U.S. states where crossings have been built.

Over and Under — Do Species Have Preferences?



Pair-wise comparison of Wolverine Overpass/Underpass and Red Earth Overpass/Underpass

Size Matters

Key Findings from Banff:

- Grizzlies selected larger structures – overpasses & open spans
- Use has increased with time – 17 years of data
- Family groups strongly selected overpasses

<u>Most important finding:</u>

"If PCA would have built only cheaper underpasses, demographic connectivity would have been severed"

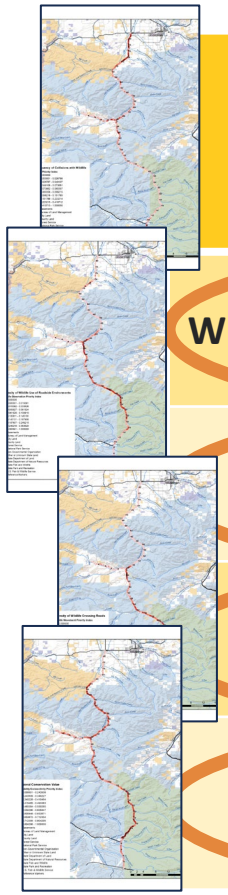
Ford et al. 2017. Road Mitigation Is a Demographic Filter for Grizzly Bears. Wild.Soc.Bull.

Wildlife & Transportation Assessment: Methodology

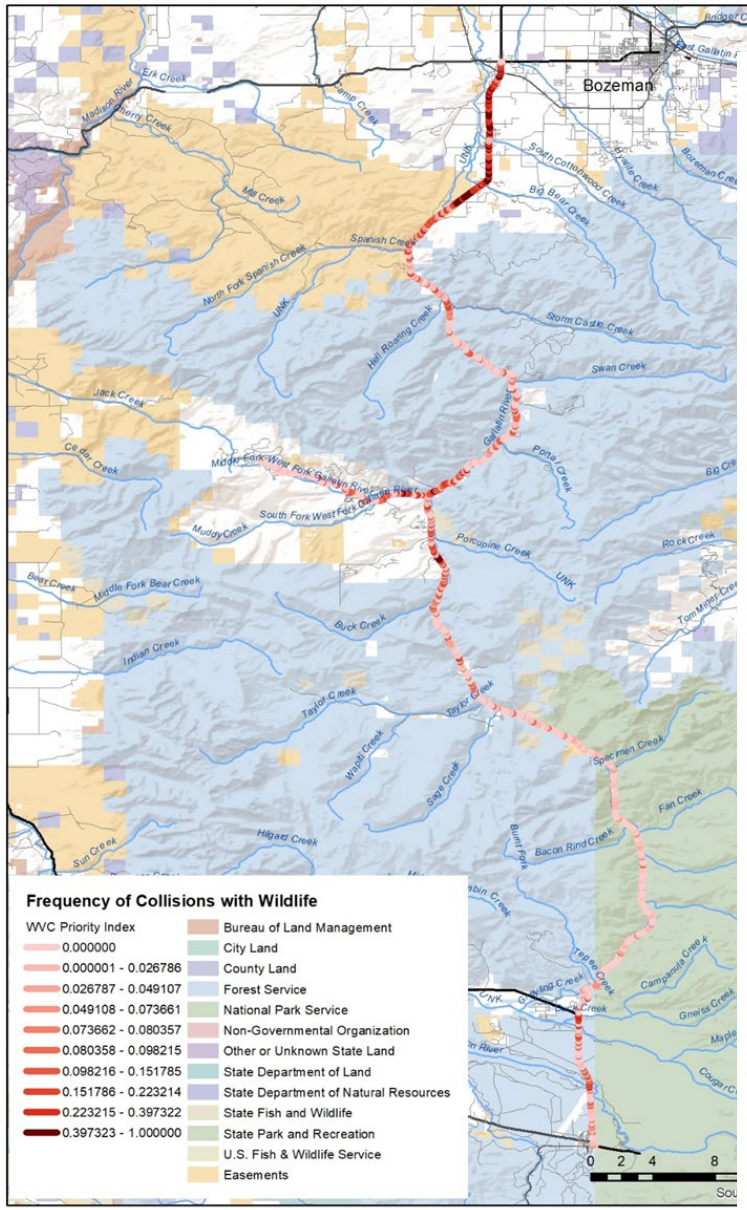
Bring together wildlife and crash information	Incorporate local knowledge	Field visits	Identify options
Overlay wildlife-vehicle crash, wildlife carcass, wildlife movement & habitat connectivity model data.	Incorporate local knowledge gathered through the ROaDS Tool, interactive map, and public outreach.	Evaluate safety risk, conservation value, landscape context and engineering feasibility.	Identify prospective options for near-term (2-5 year) and longer-term (> 5 year) implementation.

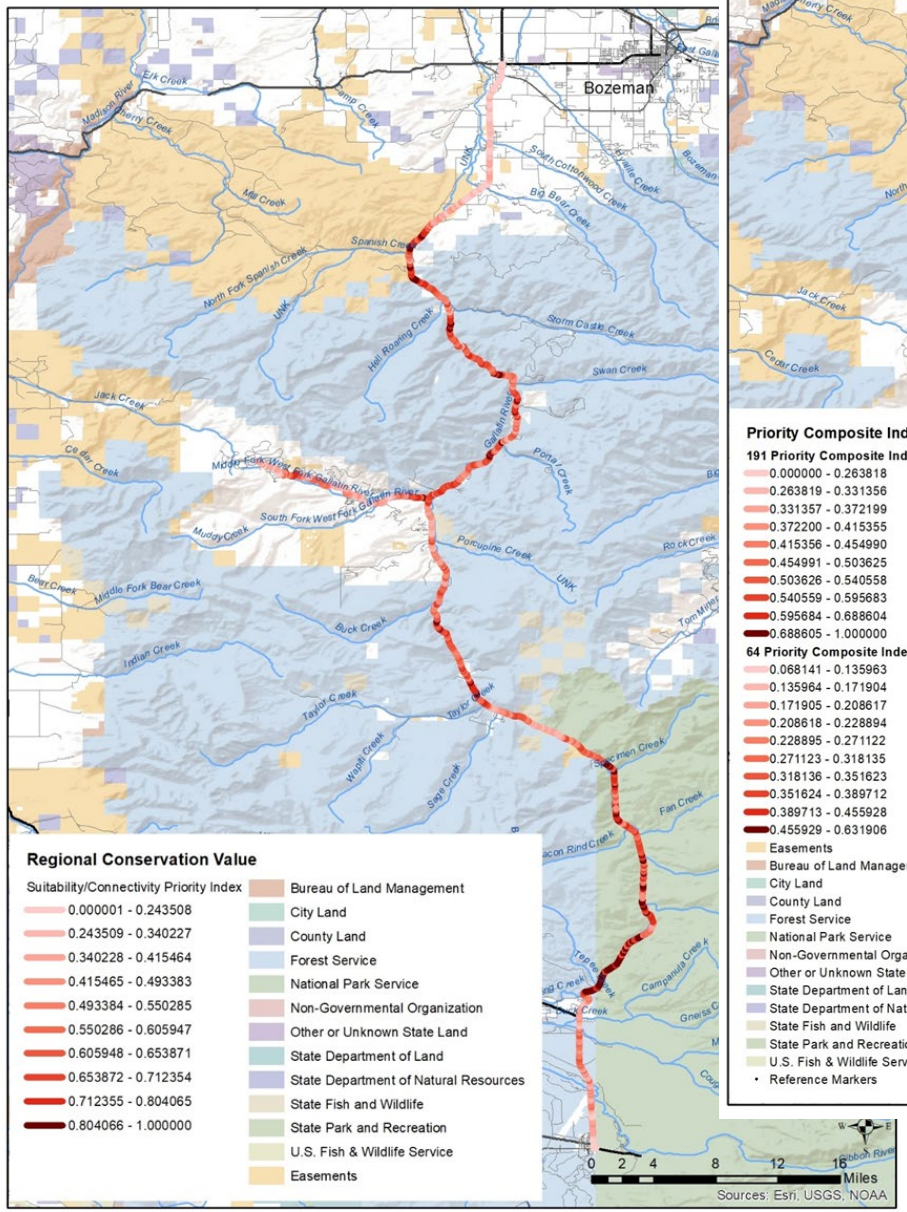
Spatial Analysis: Mapping Key Characteristics

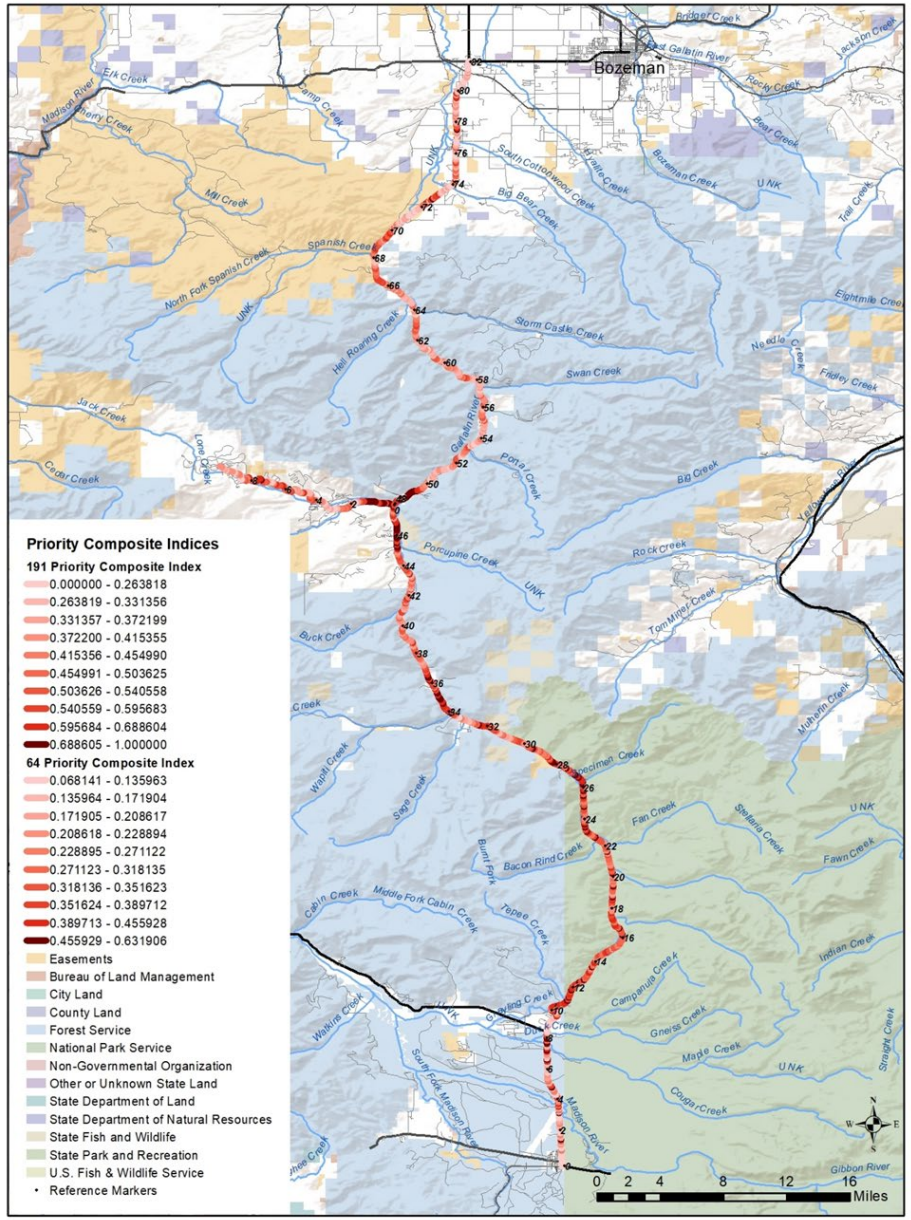
- Most data sets: 10+ years or longer (through 2020 or 2022).
- Each 0.1-mile segment along US-191 (Four Corners to West Yellowstone) and MT-64 evaluated.
- Analysis considered half-mile areas on either side of each 0.1-mile segment to determine sites to examine in the field.

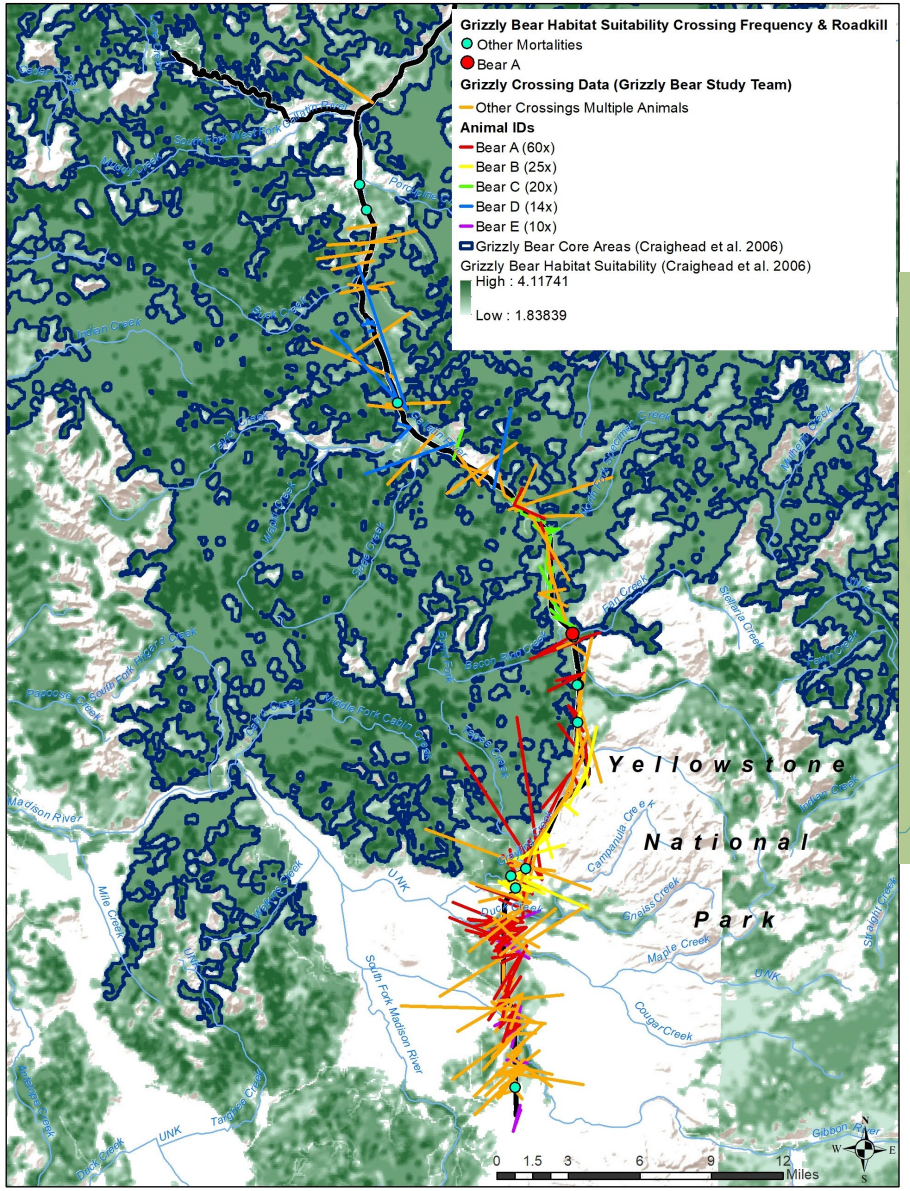


Characteristic	# of Data Sets & Sources	Percentage of Initial Score for each site
Wildlife-Vehicle Collision Risk	4 [crash & carcass (MDT); roadkill (IGBST); ROaDs]	30%
Wildlife Observations (Near Road)	4 [flight & elk collar (FWP); ROaDs]	10%
Road Crossings	3 [elk collar (FWP) & bear collar (IGBST); ROaDs]	30%
Habitat Suitability/Connectivity	14 models [models for 9 species (incl. bighorn sheep, wolverine, and sage grouse) + riparian/climate]	30%


Bozeman
Frequency of Collisions with Wildlife
WVC Priority Index
0.000000
0.000001 - 0.026786
0.026787 - 0.049107
0.049108 - 0.073661
0.073662 - 0.080357
0.080358 - 0.098215
0.098216 - 0.151785
0.151786 - 0.223214
0.223215 - 0.397322
0.397323 - 1.000000
Bureau of Land Management
City Land
County Land
Forest Service
National Park Service
Non-Governmental Organization
Other or Unknown State Land
State Department of Land
State Department of Natural Resources
State Fish and Wildlife
State Park and Recreation
U.S. Fish & Wildlife Service
Easements
0 2 4 8

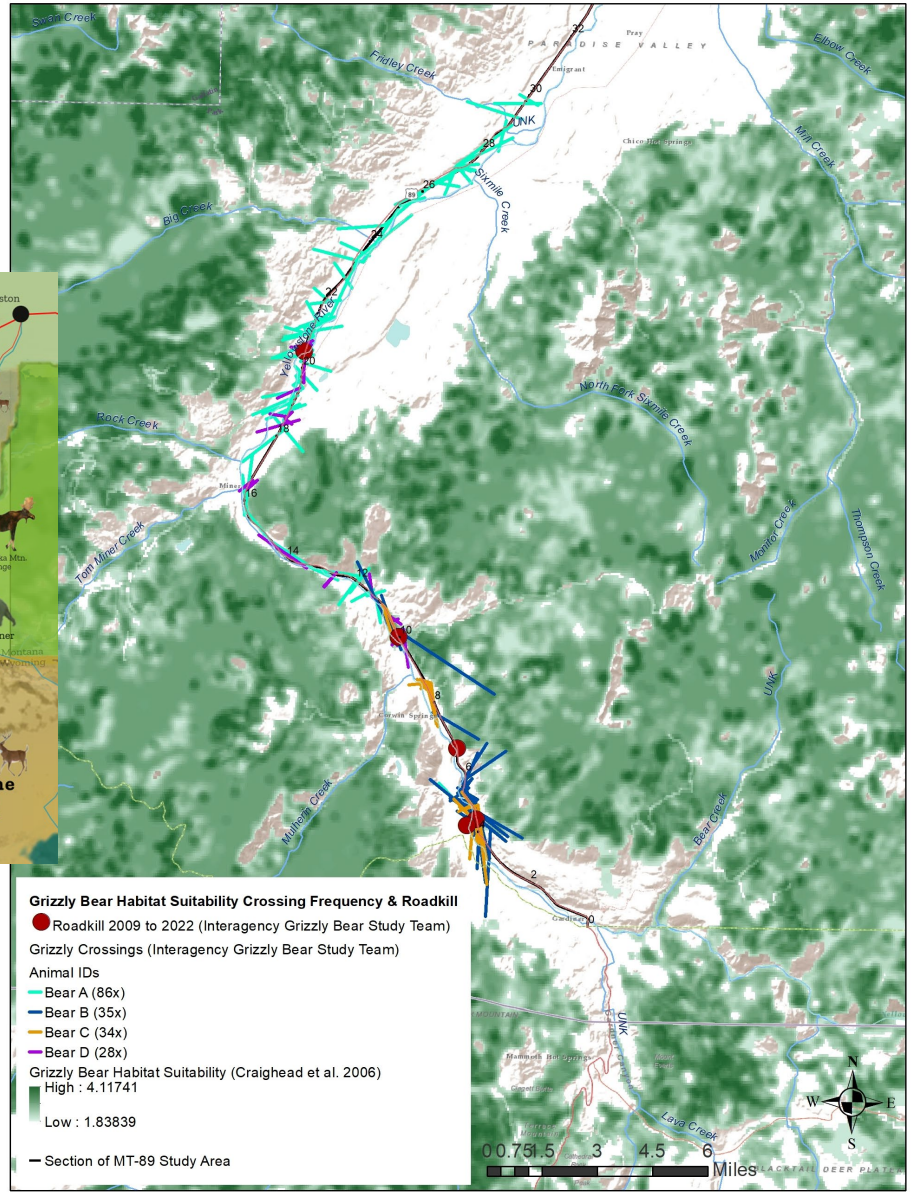

Bozeman
Regional Conservation Value
Suitability/Connectivity Priority Index
0.000001 - 0.243508
0.243509 - 0.340227
0.340228 - 0.415464
0.415465 - 0.493383
0.493384 - 0.550285
0.550286 - 0.605947
0.605948 - 0.653871
0.653872 - 0.712354
0.712355 - 0.804065
0.804066 - 1.000000
Bureau of Land Management
City Land
County Land
Forest Service
National Park Service
Non-Governmental Organization
Other or Unknown State Land
State Department of Land
State Department of Natural Resources
State Fish and Wildlife
State Park and Recreation
U.S. Fish & Wildlife Service
Easements
0 2 4 8 12 16
Miles
Sources: Esri, USGS, NOAA


Bozeman
Priority Composite Indices
191 Priority Composite Index
0.000000 - 0.263818
0.263819 - 0.331356
0.331357 - 0.372199
0.372200 - 0.415355
0.415356 - 0.454990
0.454991 - 0.503625
0.503626 - 0.540558
0.540559 - 0.595683
0.595684 - 0.688604
0.688605 - 1.000000
64 Priority Composite Index
0.068141 - 0.135963
0.135964 - 0.171904
0.171905 - 0.208617
0.208618 - 0.228894
0.228895 - 0.271122
0.271123 - 0.318135
0.318136 - 0.351623
0.351624 - 0.389712
0.389713 - 0.455928
0.455929 - 0.631906
Easements
Bureau of Land Management
City Land
County Land
Forest Service
National Park Service
Non-Governmental Organization
Other or Unknown State Land
State Department of Land
State Department of Natural Resources
State Fish and Wildlife
State Park and Recreation
U.S. Fish & Wildlife Service
Reference Markers
0 2 4 8 12 16
Miles



< Highway 191

Highway 89 >



Site Visits: Research Team & Technical Advisory Committee

- Center for Large Landscape Conservation
- MSU's Western Transportation Institute
- Gallatin County
- Montana Department of Transportation
- US Forest Service
- US Fish & Wildlife Service
- Federal Highway Administration
- Interagency Grizzly Bear Study Team
- National Park Service

Plus, data and insight from Montana Fish, Wildlife & Parks

Researchers, wildlife biologists, transportation & land use planners, & engineers

9 Characteristics Scored by Consensus at Each Site

Spatial Analysis (mapping)

1. Wildlife-vehicle Collision Risk
2. Wildlife Crossing Roads
3. Wildlife Observations (near roads)
4. Habitat Suitability/Connectivity

Field Evaluation

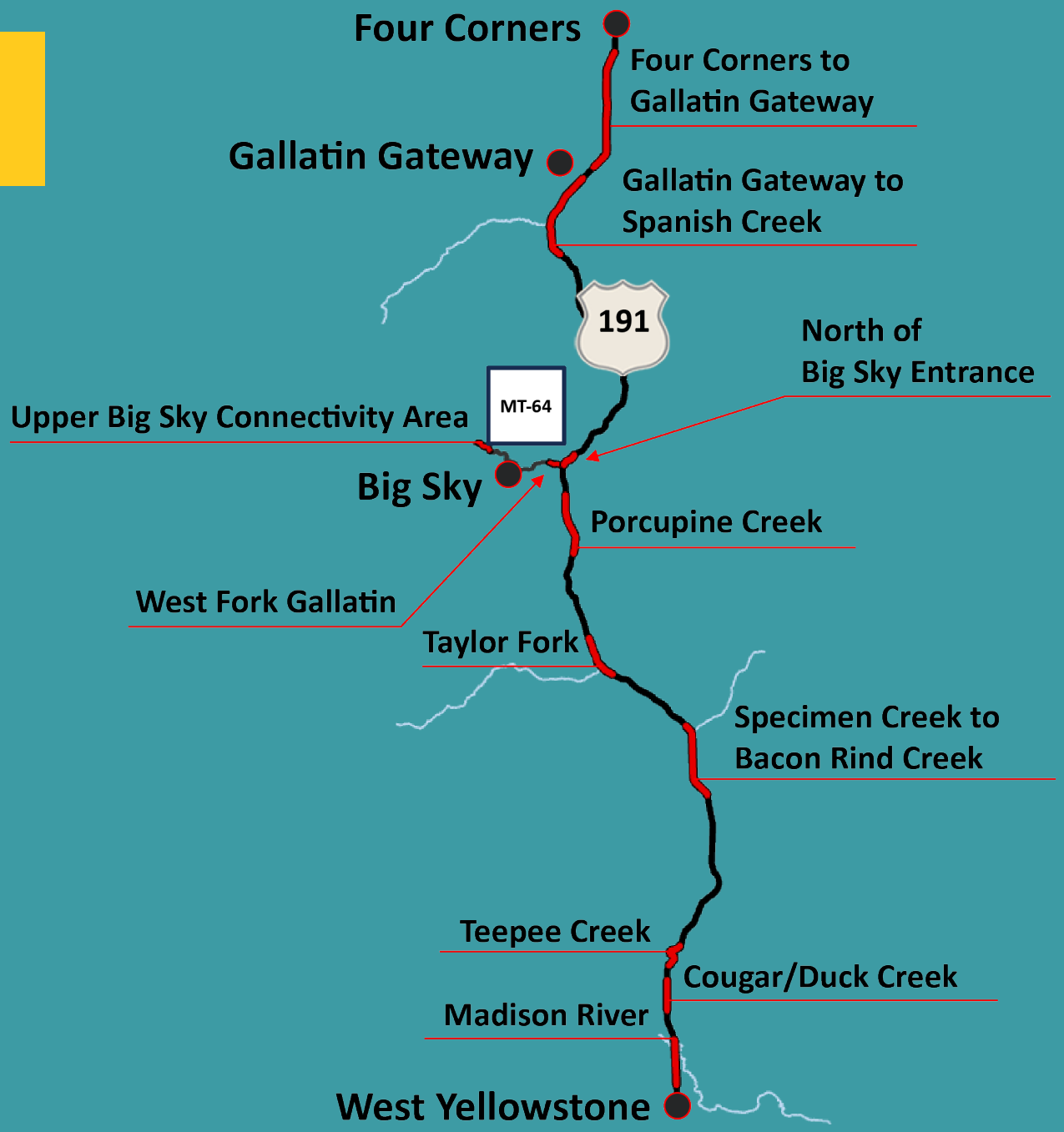
5. Land security
6. Local conservation value
7. Mitigation options
8. Barrier effect
9. Vulnerability

Example: Specimen Creek to Bacon Rind Creek Field Evaluation Scores and Priority Ranking

Priority Site	WVC Risk	Wildlife Crossing Road	Live Wildlife Near Road	Regional Conservation Value	Land Security	Local Conservation Value	Wildlife Accommodation Options	Barrier Effect	Vulnerability	Overall Average Score	Priority Rank
Specimen Creek - Bacon Rind Creek	1	2	2	4	5	5	2	1	2	2.67	3

Priority Sites

:Priority Sites



Showcase Results and Consult on Next Steps

Recommendations for 11 priority sites

- 3 sites: potential for wildlife overpasses
- Multiple sites: bridge replacement/adaptation and/or culvert enlargement
- Traffic calming, animal detection systems, and fencing

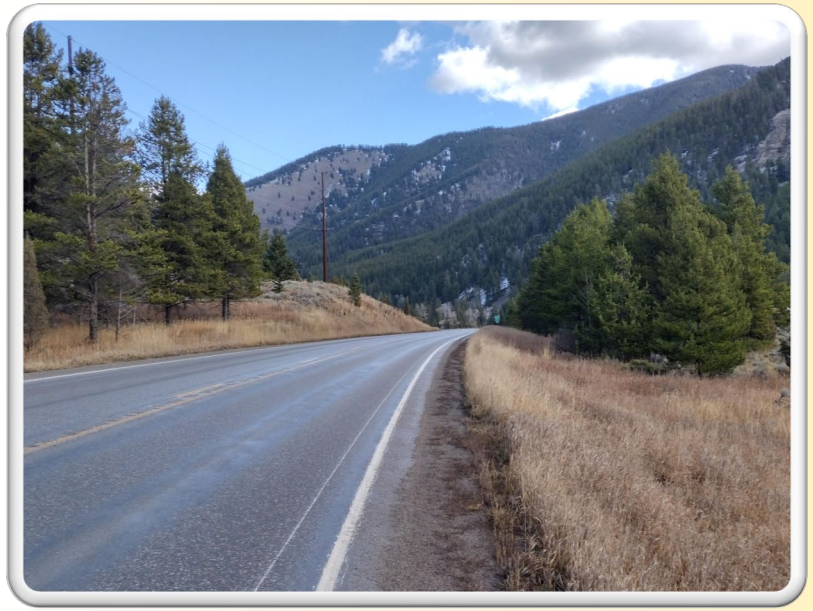
Existing Bridge

near mouth of Gallatin Canyon

Bridge Retrofit

Existing Bridge
Spanish Creek Bridge

Upsizing Structures at the End of Their Lifespan



Existing Roadway

Wildlife Overpass

Exciting New Opportunities in Montana!

Since 2018, MSWP, MDT and FWP have partnered to work together to address wildlife and transportation conflict across the state

Montana Wildlife and Transportation Partnership Project Program

Application cycles Fall and Spring!

Wildlife Crossings Pilot Program

A competitive grant program to reduce wildlife-vehicle collisions while improving habitat connectivity for terrestrial and aquatic species.

- Federal funds included in Bipartisan Infrastructure Law (2021).
- $350 Million over 5 years.
- $112 Million allocated.
- 3 more funding cycles; final funds allocated in Fiscal Year 2026
- **Requires 20% non-federal match – need for strong public-private partnerships!!**

Potential Timeline

The world of Infrastructure moves slowly, this is just the first step!

MDT's Optimization Plan for 191/64:

- Ongoing, will be a 12-18 month process with a formal public comment period through MDT's project website
- CLLC will work to integrate the findings of this assessment into the Optimization Plan and will serve as advisors on wildlife issues for that process

Action Plan Development:

- To be completed Summer of 2024.

Submission to the MTWTPP:

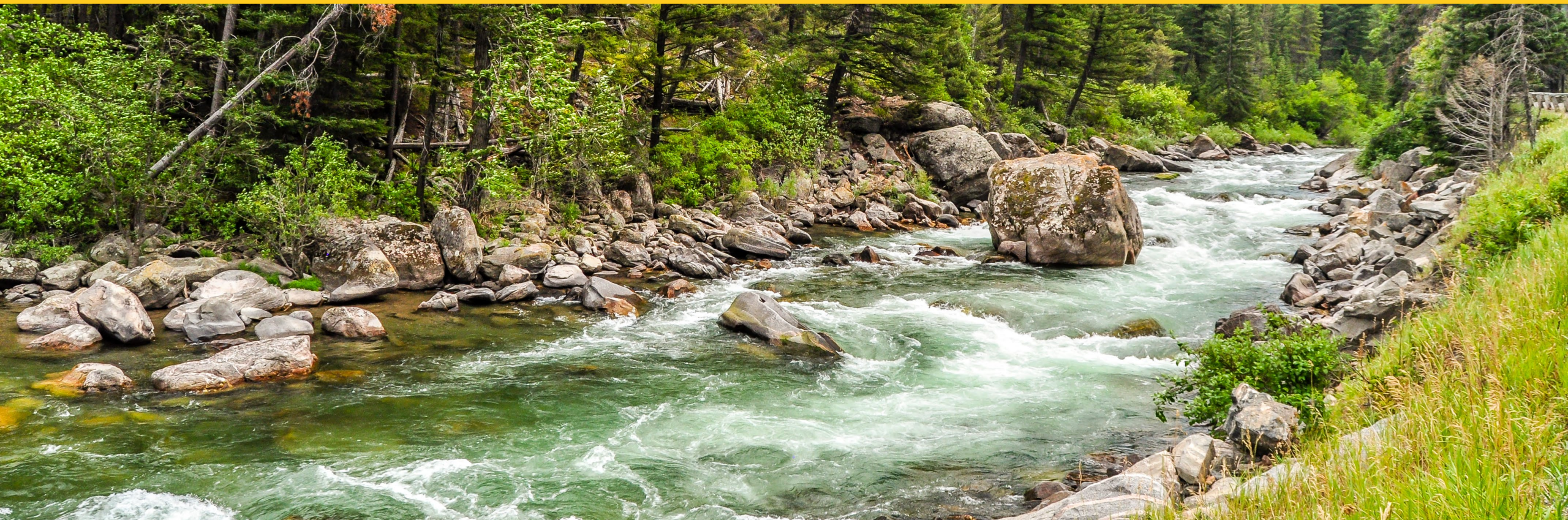
- May 2024 at the earliest. If selected, the project will move into engineering feasibility analysis which is a 12-18 month process.

Submission to WCPP/other IIJA programs:

- Summer of 2025 at the earliest

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.



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Trapper’s Point, US- 191 in Wyoming

- 2012: 2 overpasses, 6 underpasses, and fencing completed along a 12-mile stretch of US-191 near Pinedale.
  - Within 3 years:
    - Wildlife-Vehicle Collisions (WVCs) dropped by 81%; pronghorn collisions eliminated;
    - Used by >5,000 pronghorn and mule deer to move between summer and winter range.
  - Cost: $11M; Prior estimate: WVCs at Trapper’s Point cost > $500,000/year.
  - Crossings will pay for themselves in +/- 17 years; 50 years ahead of 75-year lifespan.