ARC

SPECIAL PUBLICATION

WILDLIFE CROSSING SUCCESS STORIES IN THE WESTERN STATES

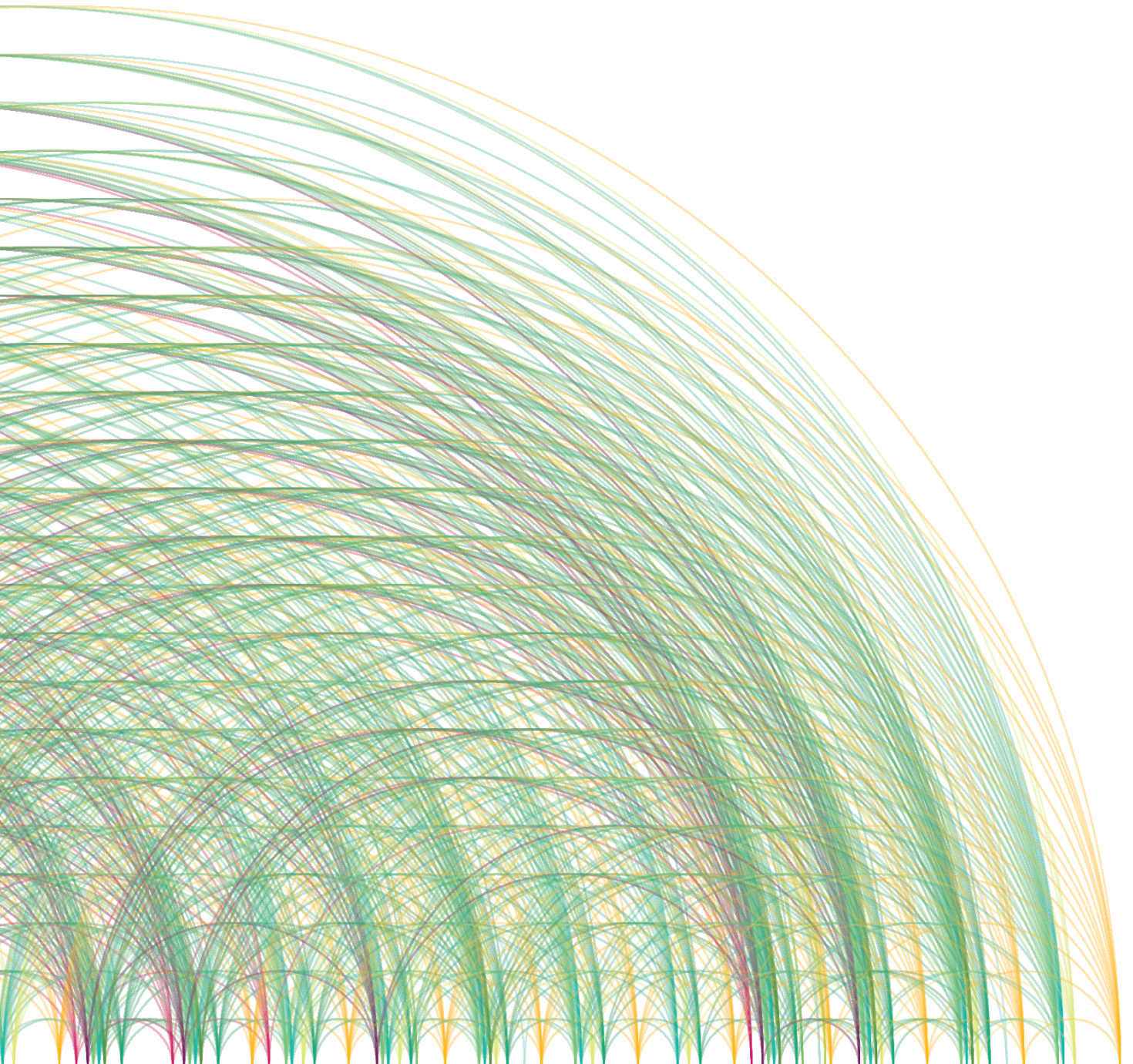
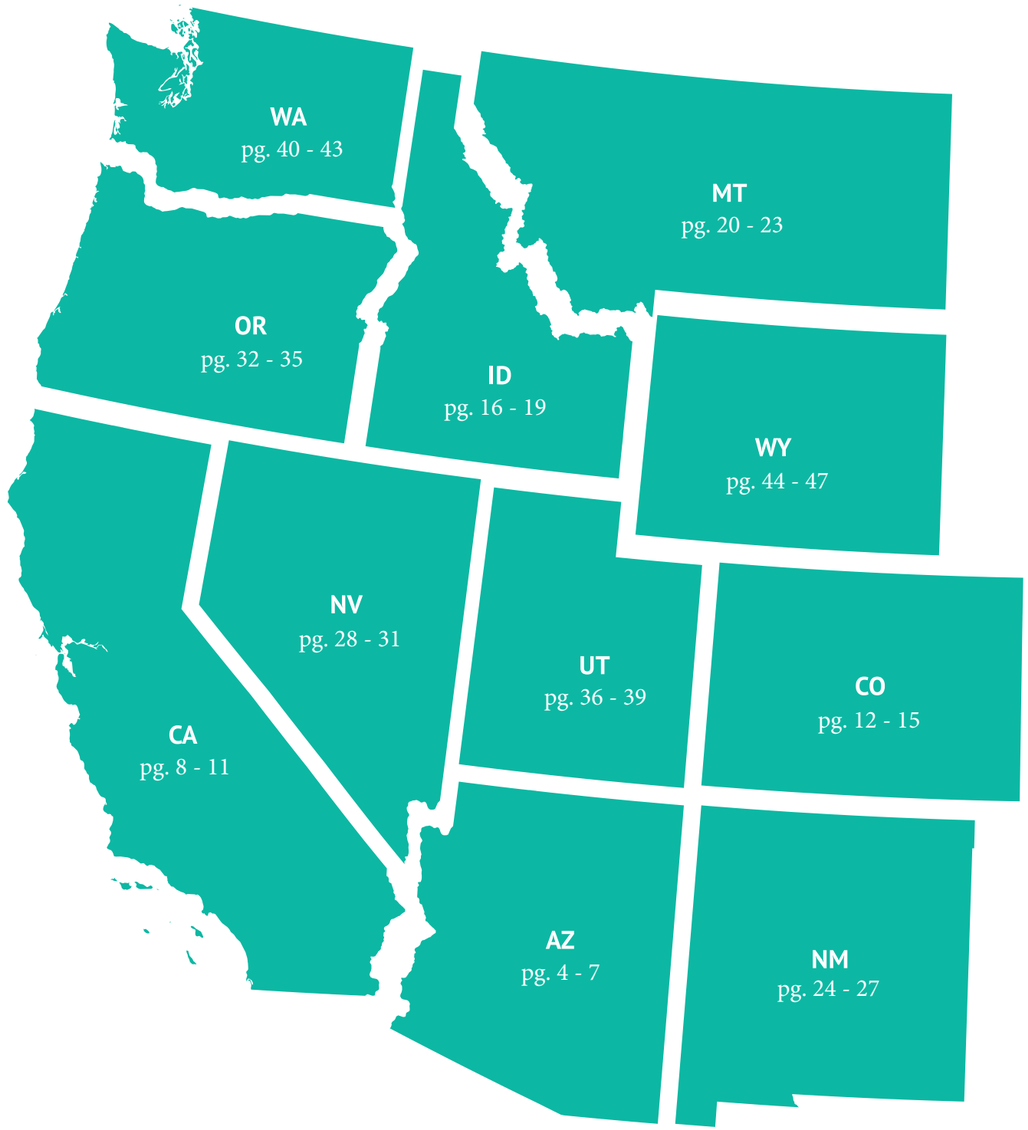


TABLE OF CONTENTS



Every 26 seconds – or less – a driver hits an animal, making highways one of the greatest barriers to wildlife movement in the United States. In addition to killing 1-2 million large animals every year, these collisions cause 200 human fatalities and over 26,000 injuries, at a cost to Americans of more than $8 billion annually. Road mortality is also a serious threat to 21 endangered and threatened species. The good news is there are proven solutions to this problem: Placed in areas of known wildlife movement, wildlife crossing structures with associated elements such as fencing, have been shown to reduce motorist collisions involving wildlife by up to 97%.

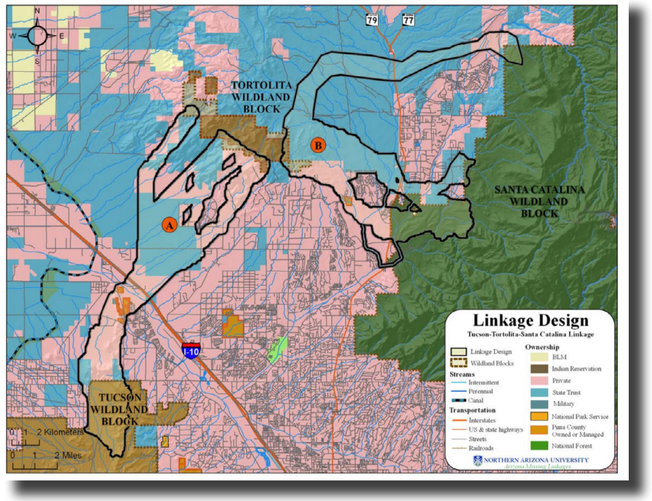
In celebration of how people from all walks of life are working together to solve this problem, ARC Solutions has worked with its partners and cooperating agencies to compile this series of stories to celebrate existing and planned wildlife crossing projects aimed at making our highways safer for both people and wildlife. Although ARC ultimately plans to highlight stories from across North America, including all 50 States as well as Canada and Mexico, this initial version focuses on efforts to protect wildlife movement corridors and prevent wildlife-vehicle collisions made by 11 Western States, including Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

We hope you enjoy this showcase of completed and planned initiatives featuring a diversity of species, from toads to pronghorn to mountain lions; a range of landscapes, from urban to rural and in between; and a host of public and private partners, from federal, tribal, state and local agencies, to private companies, non-governmental organizations, philanthropic foundations and other stakeholders.

ORACLE ROAD CROSSING STRUCTURES

Road | State Route 77 (Oracle Road)
Structures | Overpass and Underpass
Target Species | Deer

The Sonoran Desert's first wildlife overpass and a companion wildlife underpass were completed in 2016 along State Route 77/Oracle Road near Tucson, Arizona. Built to provide safe passage for mule deer and other wildlife across Oracle Road, the project helped reconnect one of Arizona's most vulnerable linkages between the Santa Catalina and the Tortolita Mountain ranges, as identified by stakeholders in the 2006 Arizona Wildlife Linkage Assessment. As of spring 2020, 26 different species had been observed using the crossings for a total of more than 10,000 unique wildlife crossings. Annual crossing numbers have increased every year since construction was completed, with deer exhibiting a preference for the overpass and other species appearing to prefer the underpass. This project was made possible by an innovative ½ cent sales tax, approved by Pima County voters in 2006, which provided funding to build the two crossings as part of a larger planned transportation project that widened the roadway to accommodate more traffic. Project partners include: Arizona Department of Transportation, Arizona Game and Fish Department, Coalition for Sonoran Desert Protection, Pima County Regional Transportation Authority, and Sky Island Alliance.



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Website: Oracle Road Crossing Structures: Frequently Asked Questions
Report: Project Progress Report (2020)
Report: Arizona Wildlife Linkages Assessment (2006)

HOOVER DAM
BIGHORN SHEEP OVERPASSES

Road | U.S. Highway 93
Structures | Three Overpasses
Target Species | Desert Bighorn Sheep

In 2011, the Arizona Department of Transportation built three wildlife overpasses over U.S. Highway 93 in northwest Arizona to help desert bighorn sheep move safely across this busy highway. A primary trade corridor connecting Canada, Mexico and the U.S., Hwy 93 has seen a steady increase in truck traffic in recent years and is also one of the main thoroughfares used by visitors to Las Vegas, Nevada. The network of overpasses not only improves driver safety by reducing motorist crashes involving wildlife, but also promotes survival of the western U.S.'s largest population of desert bighorn sheep, native to the Black Mountains. As of 2020, the overpasses had been used more than 6,000 times by desert bighorn sheep and a variety of other species, including bobcat, gray and kit fox, deer, and coyote.

High quality, durable video and photography systems were installed with these overpasses, which have aided in monitoring their usage by wildlife. The project also involved the successful collaboration of myriad federal, state and non-profit partners, including the Arizona Department of Transportation, Arizona Game and Fish Department, the Federal Highway Administration, National Park Service, Bureau of Land Management, and Arizona Desert Bighorn Sheep Society, showcasing the power of the public-private partnership in making these projects a reality.

LEARN MORE

Film: AZ Game and Fish Educational Film
Report: U.S. Route 93 Long-Term Monitoring

SIERRA NATIONAL FOREST
YOSEMITE TOAD CROSSING

Road | Sierra National Forest Road 9S09
Structures | Elevated Roadway
Target Species | Yosemite Toad

The Yosemite Toad, endemic to California's Sierra Nevada Mountains, is endangered. These toads can meet their end under the wheels of vehicles along stretches of Sierra National Forest roads, which could reduce the chances of this species' recovery. The Forest collaborated with the U.S. Geological Survey to address this issue by building an elevated roadway on a Forest road section experiencing higher levels of mortality, along with fencing to funnel toads towards and under the elevated crossing. The elevated roadway effectively creates an "underpass" for toads to cross the road, thereby reducing the number of toad mortalities as they move from their upland habitat on one side of the roadway, to their wetland breeding area, which lies on the other side. While other agencies have built amphibian and reptile crossings, those structures are often quite small and narrow. By elevating about 100 feet of road, the Yosemite crossing is not only much wider but is also permeable to rainfall and light, which gives the toads a better chance of successfully making the seasonal trek across the road.

This project was made possible by a robust partnership including the California Department of Transportation, U.S. Geological Survey, U.S. Forest Service, and U.S. Fish & Wildlife Service. Toads have already been documented using this re-established, risk-free corridor, and researchers continue to monitor the project's effectiveness. Upon completion, the project is expected to confirm the utility of using elevated roadway crossings to provide safe passage for reptiles and amphibians.

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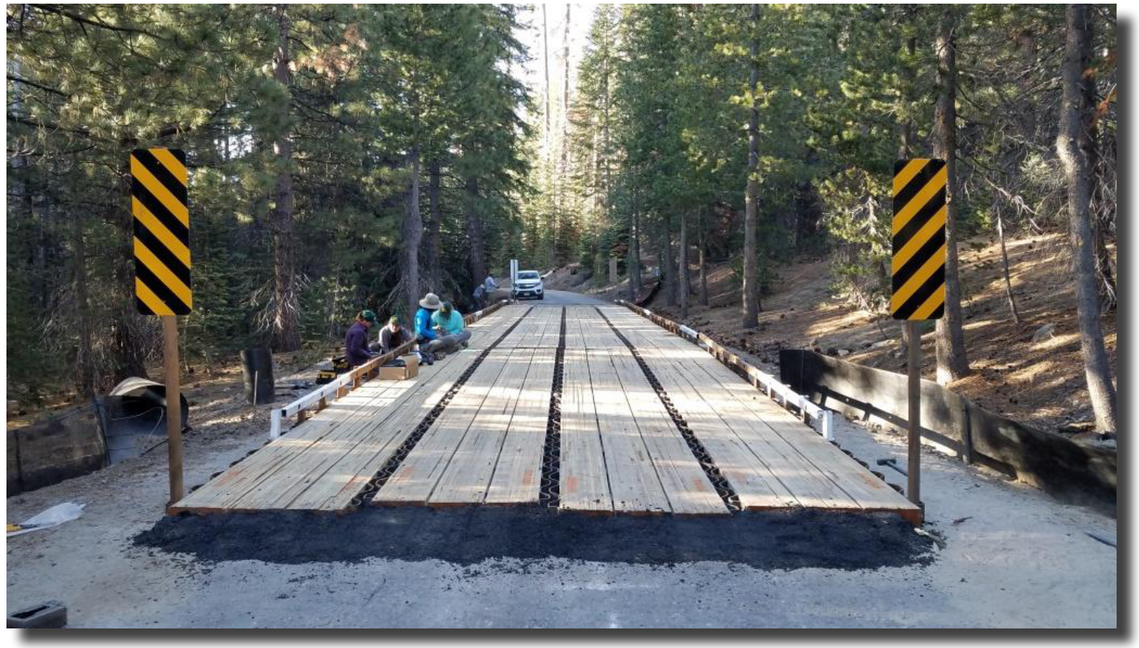
Article: Toad Crossing Ahead: New Study Tests Elevated Roads as Underpasses for Rare Toad
Study: Paving a Path Forward for Reptiles, Amphibians, and Roadways



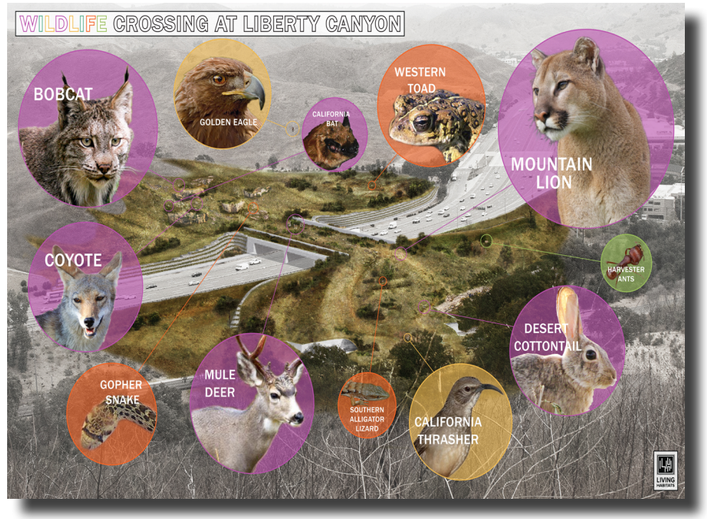
WILDLIFE CROSSING AT LIBERTY CANYON

Road | U.S. Highway 101
Structures | Overpass
Target Species | Mountain lion, small and large mammals, birds, amphibians and reptiles

The wildlife crossing at Liberty Canyon, aimed at reconnecting habitat for southern California native wildlife and plant populations, including mountain lions, will be one of the largest wildlife overpasses in the world when completed and is slated to break ground in 2021. The structure, located 35 miles north of downtown Los Angeles, will be 165 feet wide by 200 feet long and will cross 12 lanes of pavement including ten lanes of US Highway 101 and two lanes of a local frontage road.

As human sprawl and roads consume wildlife habitat, many of the mountain lion populations of southern California are under extreme threat of extinction. In addition to serving as a lifeline for mountain lions, this overpass between the Santa Monica Mountains and the Simi Hills will re-connect the last best linkage from the Pacific Ocean and lands north like the Sierra Madre Mountains or Los Padres National Forest. As a 'keystone species,' mountain lions serve as an indicator for the overall health of the natural habitats where they live.

Unlike most other crossing structures, which are funded using public transportation dollars, the vast majority of the cost for the Liberty Canyon overpass (an estimated 80%) is being privately funded, with only 20% coming from public dollars already earmarked for environmental projects. To raise awareness about the project, the National Wildlife Federation created the #SaveLACougars campaign, led by Director Beth Pratt, which has been a pioneer in engaging the public via social media and other innovative outreach and funding mechanisms via the project. The overpass would not be possible without the tireless work of a dedicated group of public-private partners, including the National Wildlife Federation, Caltrans, the National Park Service, the Santa Monica Mountains Conservatory/ Mountain Recreation and Conservation Authority, and the Resource Conservation District of the Santa Monica Mountains. In addition, the partners and the Caltrans project team are working with a group of crossing experts from across the world, including Living Habitats, ARC Solutions, the Western Transportation Institute, the Road Ecology Center at UC Davis, and more.



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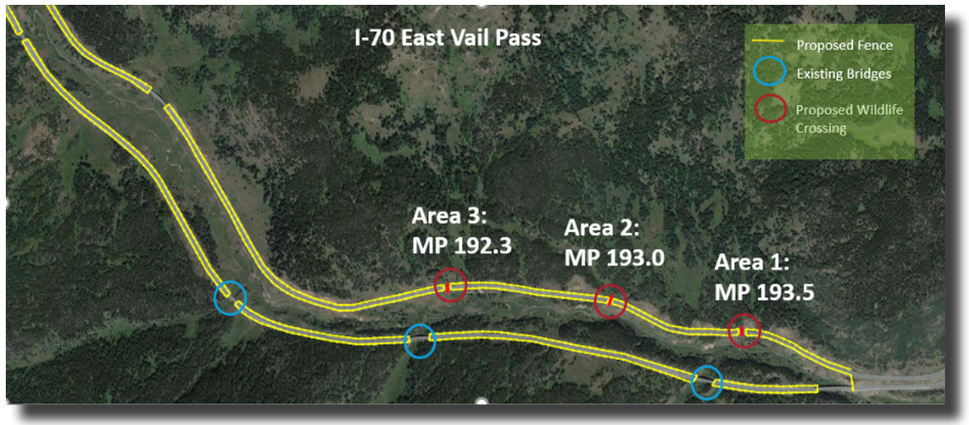
Press Release: National Wildlife Federation Unveils New Look at Landmark California Wildlife Crossing
Article: California Will Build the Largest Wildlife Crossing in the World
Article: This massive wildlife crossing will help protect wildlife from L.A. drivers on the 101

EAST VAIL PASS
CROSSING STRUCTURE NETWORK

Road | Interstate 70
Structures | Overpass, Underpasses
Target Species | Elk, Lynx

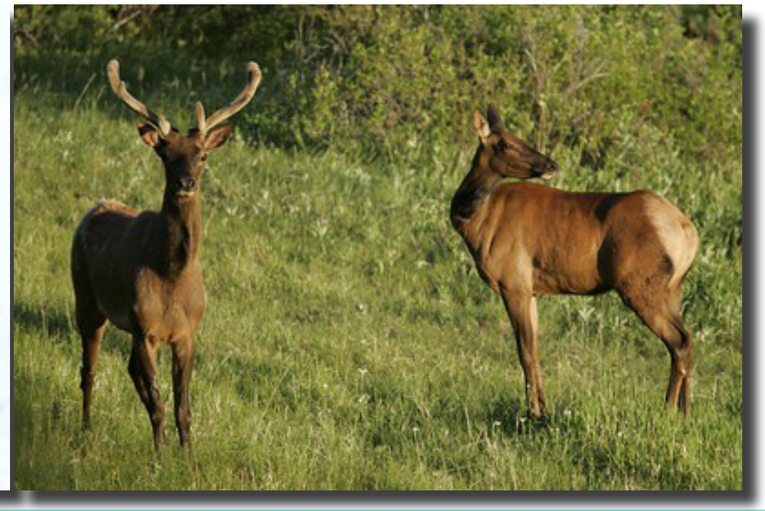
In Colorado, heavily trafficked Interstate 70, which sees upwards of 22,000 vehicles per day, cuts through the southern Rocky Mountain range. Due west of Denver, I-70 bisects important wildlife habitat near Vail Pass, where elk and Canada lynx reside, forcing them to navigate across this stretch of highway to access their ever-threatened range. When they try to cross, wildlife-vehicle collisions (WVCs) are often the result. In addition to lynx and elk, which are the resident species of highest concern, mule deer, moose, mountain lion and black bear also frequent the area and would benefit from safe passage across this highway. Currently, five large-span bridges cross under the eastbound lanes, and one bridge crosses under the westbound lanes; unfortunately, there is no direct connection across both lanes, which too often leaves animals trying to cross at-grade.



Spurred in part by their success mitigating nearby State Highway 9, local partners formed the Summit County Safe Passages (SCSP) coalition. In October 2017, SCSP released a County-Wide Connectivity Plan that identified Vail Pass as one of three priority sites for mitigation. A feasibility study exploring the construction of three potential crossing structures over the westbound lanes of I-70, including two underpasses and one overpass was completed in fall 2020. When built, these crossings would directly link habitat to the north and south of I-70, thereby allowing populations of elk, lynx, and other wildlife to thrive despite increasing traffic density.

LEARN MORE

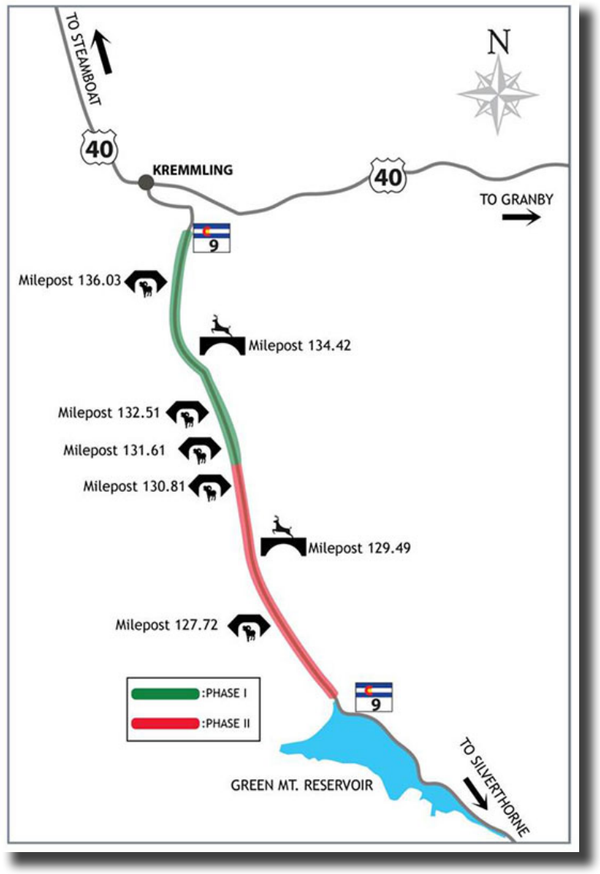
Website: SCSP Priority Initiative: Vail Pass
Article: Mountain Town News: The Berlin Wall of Wildlife
Video: I-70 East Vail Pass Wildlife Crossings



HIGHWAY 9 CROSSING SYSTEM

Road | State Highway 9
Structures | Two Overpasses and Five Underpasses
Target Species | Ungulates

Colorado's first-of-its-kind network of wildlife crossing structures was completed in 2016 as a result of collaborative efforts among the Colorado Department of Transportation, Colorado Parks and Wildlife, Blue Valley Ranch, Grand and Summit counties, Citizens for a Safe Highway 9 and other local stakeholders. The project includes two overpasses and five underpasses as well as other infrastructure necessary for wildlife to successfully find and navigate the structures. The project's primary goal is to funnel mule deer and other large ungulates such as elk and moose across Highway 9 as they move throughout their winter range. Pronghorn, bighorn sheep, black bears, mountain lions, bobcats and coyotes have also been documented using the structures. In addition to reducing motorist crashes involving wildlife by 88%, monitoring efforts have also detected more than 112,000 successful mule deer movements using these crossings. The project involved an innovative state funding program, known as the 'Responsible Acceleration of Maintenance and Partnerships' or 'RAMP,' which allowed the local community to commit to pay 20% of the project costs in exchange for the project's timeline being accelerated. Led by a local non-profit known as Citizens for a Safe Highway 9, with matching funds and in-kind contributions from the Blue Valley Ranch, the community raised over $9 million within 45 days to meet its pledged 20% commitment.



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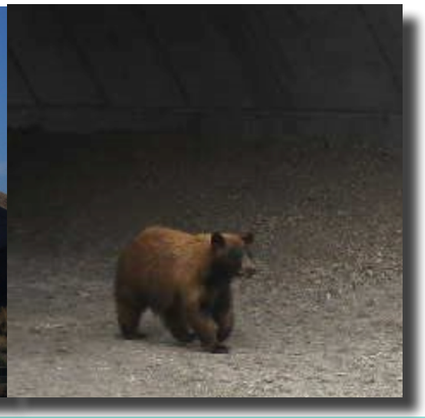
Website: CO Parks and Wildlife Project Overview
Film: A Safe Passage
Website: CO DOT Project Overview



CERVIDAE PEAK OVERPASS

Road | State Highway 21
Structures | Overpass
Target Species | Elk, Mule Deer

Funded by a $3 million Federal Lands Access Program grant, Idaho's first wildlife overpass will be built along State Highway 21, near Mile Post 19.3 of the Ponderosa Pine Scenic Byway, between Lucky Peak and Idaho City. Led by the Western Federal Lands Highway Division of the Federal Highway Administration and the Idaho Transportation Department, this project will help mule deer and elk migrate between summer range on the Boise and Sawtooth National Forests and winter range on IDFG's Boise River Wildlife Management Area, while improving safety for drivers and wildlife. Home to the largest mule deer herd in the State – upwards of 30,000 individuals– the area is rich in high-quality habitat that provides important winter range for elk and deer, making this a high conflict zone. There is an existing wildlife underpass, at Mile Post 18.2, about one mile from the proposed overpass site, which will tie into funnel fencing associated with the overpass. By guiding animals away from the highway and toward these crossing safety structures, the project aims to reduce wildlife-vehicle collisions along this stretch of highway by up to 80%. Other project partners include the Idaho Department of Fish and Game, the City of Boise, the Boise National Forest, and multiple non-profit entities including the Center for Large Landscape Conservation, Idaho Deer Alliance, Rocky Mountain Elk Foundation and the Yellowstone to Yukon Conservation Initiative. Construction is expected to break ground in 2023.

LEARN MORE

Website: Federal Highway Administration: Project Overview
Website: Idaho Transportation Department: ID-21 Cervidae Peak Wildlife Overpass

LEMHI RIVER BRIDGES REDESIGN PROJECT

Road | State Route 28
Structures | Bridges, Box culvert
Target Species | Aquatic and terrestrial species

Along State Route 28 south of Salmon, Idaho, nine bridges spanning the Lemhi River and Agency Creek were reconstructed in 2018 and 2019 to replace aging structures. The replacements are better equipped to accommodate a range of aquatic and terrestrial species. These bridges were part of a larger "17 Bridge" replacement project conducted by Idaho Transportation Department (ITD) that, through a coordinated and streamlined design-build and environmental process, were able to save taxpayers millions of dollars while expediting normal project timelines for bridge reconstruction. As a result of the cost savings, ITD was able to conduct a wildlife-vehicle collision study and install three miles of wildlife fencing to connect two bridges further reducing wildlife-vehicle conflict. All nine bridges, which were originally each over 50 years old, were enlarged as part of the project to allow the Lemhi River to span its full width as it passes underneath, enlarging the waterway and adding room for terrestrial species to travel along the riverbanks.

ITD worked with the Idaho Department of Fish and Game to incorporate fishing access locations and install bat habitat (roosting boxes and interstitial spacing between the girders) at each bridge. ITD also constructed engineered "log jams" to stabilize river banks instead of rock rip-rap to provide fish habitat for listed species like Chinook Salmon, Steelhead and Bull Trout. Species such as Townsend's big-eared bat as well as a variety of ungulates and predators will benefit from the expansion of these bridges along waterways.

By bundling many bridges into one design-build procurement process, the project encouraged innovation, accelerated its timeline, and increased efficiency by allowing managers to complete design and environmental clearances concurrently for multiple bridges. Ultimately, ITD saved approximately $6 million in design and construction costs, all while cutting nearly 20 years off the usual timeline for replacing the bridges. These and other innovative elements of the project led to its selection for the ITD 2019 Excellence in Transportation award for Environmental Stewardship, the 2018 AASHTO President's Transportation Award in Planning, and the 2018 ITD Best of the Best award for Innovation.

LEARN MORE

Article: "The Transporter" on Environmental Stewardship Award
Website: Innovate ITD!
Video: Room to Roam

U.S. HIGHWAY 200

Road | U.S. Highway 200
Structures | Two underpasses
Target Species | Elk, Moose, Grizzly Bear

In northwestern Montana near the Scapegoat Wilderness, the Montana Department of Transportation (MDT) installed two wildlife underpasses as part of a larger planned highway improvement project along Highway 200 near Lincoln, MT. While the crossings were constructed to reduce the high number of motorist crashes involving elk and moose, a wide array of species have taken advantage of the structures to safely pass under the highway. Grizzly and black bears, elk, moose, wolves, mountain lions, and sandhill cranes are just some of the species that have been captured on camera utilizing these underpasses, which helps keep both drivers and animals safer. Since construction of the crossings, which were sited and built based on wildlife movement and wildlife-vehicle collision (WVC) data, the number of WVCs along this stretch of Highway 200 has decreased.

In addition to advancing on-the-ground projects such as that on Highway 200, MDT has also been busy exploring ways to include systematic consideration of wildlife during its planning and projects. In December 2018, MDT, the Montana Department of Fish, Wildlife, and Parks (FWP), and Montanans for Safe Wildlife Passage co-hosted the state's first Wildlife and Transportation Summit. That same month, MDT adopted a Wildlife Accommodations Process aimed at systematic reviews to determine the need and feasibility of including wildlife accommodations on MDT projects. In spring 2020, MDT and FWP signed a Memorandum of Agreement formalizing an agency partnership to work on wildlife and transportation issues in the state. The success of these underpasses as well as ongoing collaborative efforts suggest a bright future for safe passage of people and wildlife in the State of Montana!

LEARN MORE

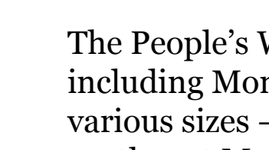
Article: From Bighorn Sheep to Bears to Birds, Cameras Capture Wildlife Using Underpasses
Website: Montana Wildlife and Transportation
Website: Montanans for Safe Wildlife Passage

U.S. HIGHWAY 93 NORTH
THE PEOPLE'S WAY

Road | U.S. Highway 93 North
Structures | Overpass, underpasses
Target Species | Grizzly & black bear, elk, mule & white-tailed deer, other mammals, reptiles and amphibians, fish

The People's Way Project installed 41 wildlife crossing structures – including Montana's first wildlife overpass and dozens of underpasses of various sizes – along Highway 93 on the Flathead Indian Reservation in northwest Montana. This highway reconstruction process reflected the Confederated Salish and Kootenai Tribes connection to the land and the Montana Department of Transportation's responsibility to the traveling public. Negotiations between the Tribes, State and the Federal Highway Administration resulted in a holistic agreement for the reconstruction project.

"*From that process came a radical idea: instead of focusing on how the road will impact the land, focus on how the land should shape the road. The team called this approach a "Spirit of Place." The Spirit of Place constitutes more than just the road, it takes into account the surrounding mountains, plains, hills, forests, valleys, and sky. It includes the paths of waters, glaciers, winds, plants, animals, and native people — the whole continuum of what is seen, touched, felt, and traveled through. The design of the roadway would be premised on the idea that the road is a visitor and should respond to and respect the Spirit of Place.*" (Western Transportation Institute, 2019)



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Website: US-93 North Post-Construction Wildlife Crossing Structure Monitoring
Video: Wildlife Using Highway 93 Crossings
Report: Post Construction Monitoring Project Summary

The project partners developed one of the most wildlife-sensitive highway designs in all of North America, which won the 2001 AASHTO President's Transportation Award for the Environment and the 2008 Federal Highway Administration Transportation Planning Excellence Award. Monitoring took place before and after the construction in order to ensure the crossings were built in effective locations and to detect the frequency and type of animal use. From 2010-2012, more than 53,000 individual movements were recorded by more than 30 unique species, including black and grizzly bear, mountain lion, bobcat, white-tailed and mule deer, elk, river otter, mallard duck, and turkey.

As the name suggests, the project was a result of a unique partnership between tribal, state and federal agencies; enhanced by research through Montana State University's Western Transportation Institute and outreach partnerships with Defenders of Wildlife. Additional research is needed to learn more about wildlife tolerance, acceptance and use of highway mitigation measures.

TIJERAS CANYON SAFE PASSAGE PROJECT

Road | Interstate 40 and State Highway 333
Structures | Underpasses and warning system
Target Species | Ungulates, carnivores

Just outside Albuquerque, Interstate 40 and State Highway 333 cut through Tijeras Canyon. This canyon houses Tijeras Creek and serves as a wildlife corridor between the Sandia and Manzano Mountains. Wildlife such as deer, black bear, and cougar traverse this canyon as they move between the mountain ranges, seeking access to water as well as food, shelter, and mates. Since 2006, thanks to a public-private partnership including the Tijeras Canyon Safe Passage Coalition, New Mexico Department of Transportation, and New Mexico Department of Game and Fish, multiple projects in the canyon have led to safer passage for people and wildlife.

This work includes the construction of five miles of wildlife-proof fencing to funnel wildlife below Interstate 40 via a bridge that spans the Tijeras Arroyo. About a half-mile away, wildlife are guided to a break in the fencing along Highway 333 (the old Route 66), where a warning system and electrified mats are installed. The mats act like electric cattle guards, allowing wildlife to cross perpendicularly across the highway within the designated crossing area while preventing them from intruding into the fenced portion of the roadway. Blinking lights from dusk until dawn warn motorists of potential wildlife crossings at the crossing area.

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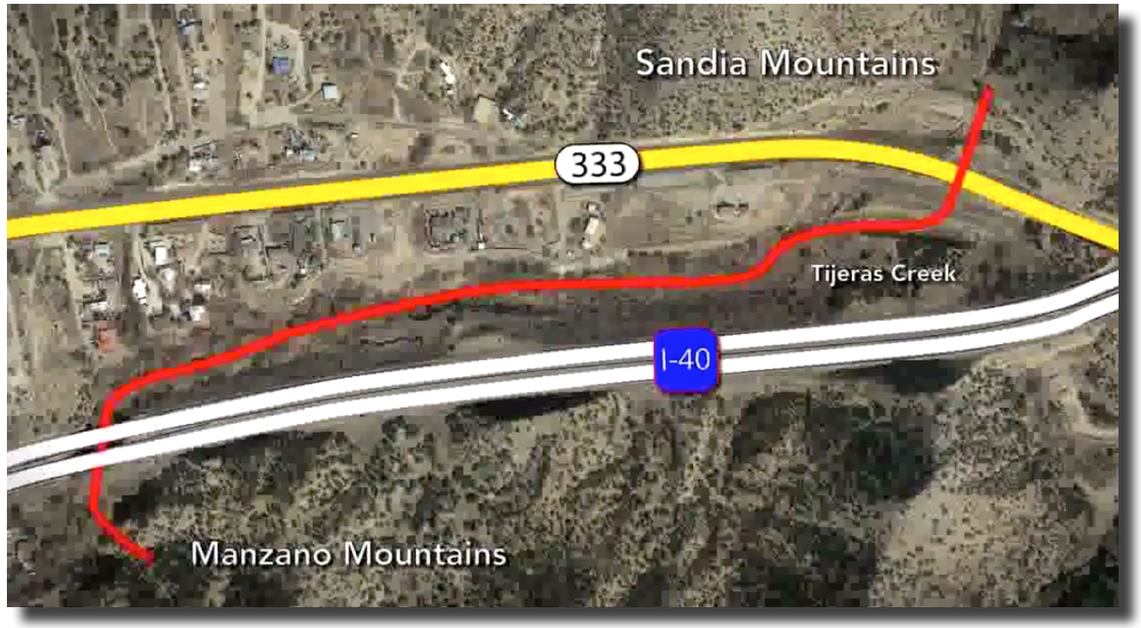
Video: Making Crossings Safe for Wildlife and People
Article: In New Mexico Canyon, A Novel Way to Prevent Roadkill

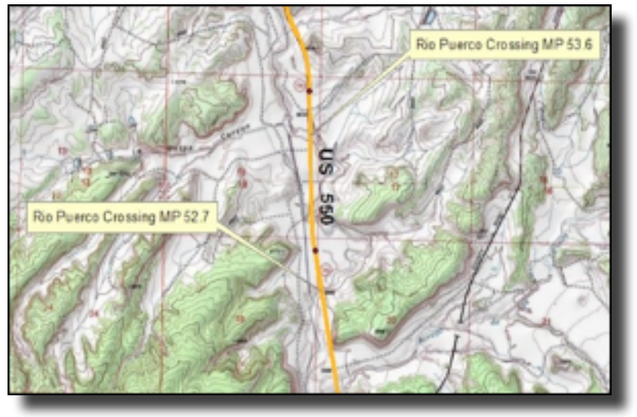
This project arose from the efforts of Wild Friends, a statewide student group organized through the University of New Mexico School of Law, to work with Grades 4 through 12 to draft legislation on issues students find important. In 2003, the classrooms tackled wildlife-vehicle collisions, lobbying the state legislature to convene a workshop to investigate the problem. The legislature agreed, and a subsequent analysis identified Tijeras Canyon as a priority WVC hot-spot that needed to be fixed!



CUBA U.S. HIGHWAY 550 PROJECT

Road | U.S. Highway 550
Structures | Wildlife detection systems and fencing
Target Species | Mule deer and elk

A four-mile stretch of U.S. Highway 550 south of Cuba was identified as having a high number of wildlife-vehicle collisions (WVCs). In addition to injuries and property damage, the crashes also resulted in one human fatality. In 2019, the New Mexico Department of Transportation (NMDOT) sought to address this WVC hot spot by installing 8-foot high woven wire fencing to prevent mule deer, elk and other wildlife from entering the roadway. Two existing bridges within the fenced area provided safe wildlife passage under the roadway. NMDOT also installed electrified concrete barriers and animal detection systems (ADS) at both fence ends to address possible end run events. The electrified concrete barriers prevent mule deer and elk from getting trapped within the roadway at fence ends. The ADS are designed to warn motorists of wildlife present at fence ends. The goal of the project is to enhance safety for the traveling public while also providing safe wildlife passage. The project was completed in 2019, and NMDOT is collecting wildlife passage data at both bridges. Preliminary data indicates mule deer, elk and other wildlife are utilizing the two existing bridges. Planned future research will evaluate the effectiveness of the ADS in slowing motorist's speeds.

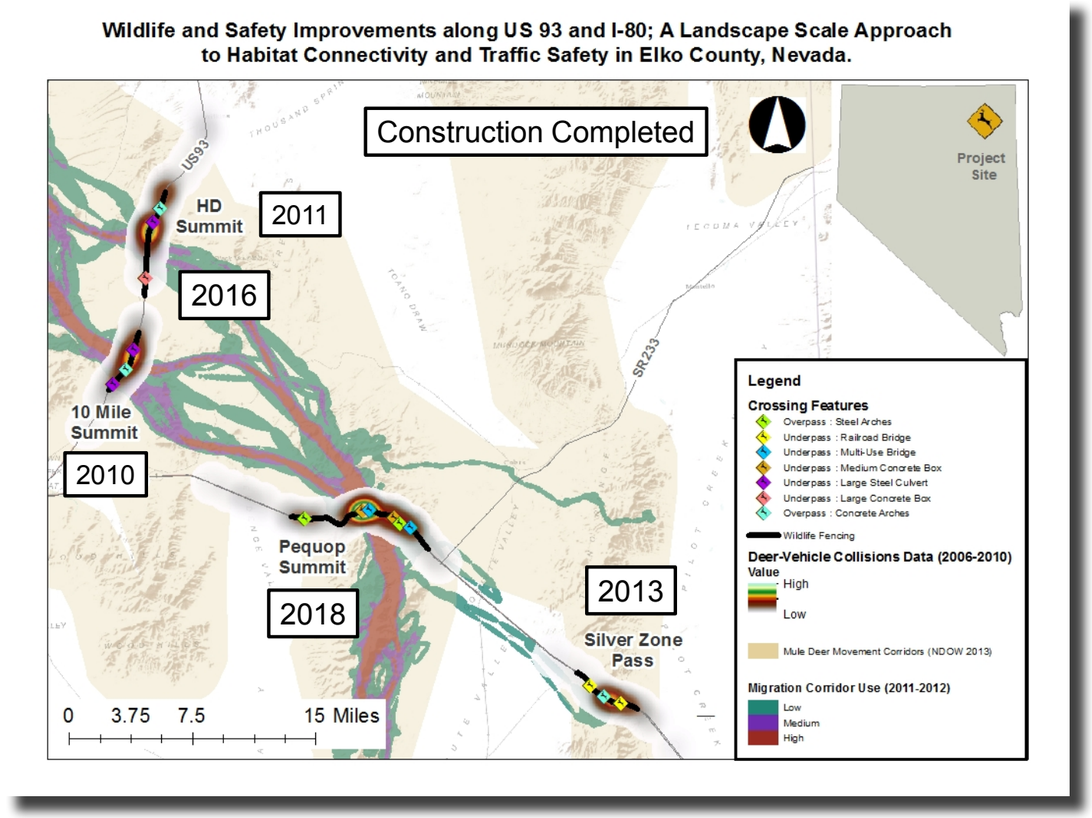


INTERSTATE 80 AND HIGHWAY 93 PEQUOP CROSSINGS NETWORK

Road | Nevada - Interstate 80 and Highway 93
Structures | Overpasses and Underpasses
Target Species | Mule deer

In rural northeastern Nevada a network of five overpasses and 10 underpasses provide safe passage for mule deer during their annual migration between their winter range in the Pequop Mountains to their summer range in the Jarbidge Mountains. The first two overpasses on Highway 93 were completed in 2010, and 35,000 individual crossings were recorded within the initial four years after completion. Three additional overpasses have since been built on Interstate 80, with the final crossings completed in 2018.

Although primarily built for mule deer, many other species including elk, pronghorn antelope, and red fox, have also used the structures. Nevada's decade long effort to improve human safety on US-93 and I-80 is featured in the documentary film, (Re)Connecting Wild: Restoring Safe Passage. Selected by over 10 film festivals, the film allows viewers to virtually witness construction of the wildlife overpasses on I-80 and the restoration of safe passage for migratory mule deer to more than 1.5 million acres of summer and winter habitat.



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Film: (Re)Connecting Wild – Restoring Safe Passage

MOJAVE DESERT TORTOISE CROSSINGS

Road | U.S. Highways 93 and 95
Structures | Retrofitted culverts
Target Species | Mojave desert tortoise

In southern Nevada, along U.S. Highways 93 and 95, 20 culverts have been retrofitted by Nevada Department of Transportation (NDOT) to improve safe passage by desert tortoises. A threatened species under the Endangered Species Act, the Mojave desert tortoise is at further risk due to road mortality, a significant contributor to its declining numbers. Tortoises began using these culverts, which were originally designed solely to address water runoff, to move across Highways 93 and 95. As a result, NDOT embarked upon an effort to retrofit the structures to better accommodate this charismatic, threatened species.

Among other innovations, NDOT has installed fencing to guide tortoises to the culverts as well as “tortoise-walks” to help them navigate around plunge pools that form on the downhill side of the culverts. Although these changes have enhanced safe passage for tortoises, challenges remain. The usage of riprap or other means of erosion prevention, for example, can make tortoise passage difficult or in some cases impossible. Failure to control against erosion, however, leaves the culverts vulnerable to large water events that are common in the desert; rendering them inaccessible to tortoises. NDOT is currently working to develop a culvert that can both serve as an easily navigable tortoise underpass, while at the same time effectively providing water passage, ideally with little to no maintenance requirements. Although current retrofitted culverts sometimes provide safe passage for tortoises, developing a next-generation design for desert tortoise underpasses will be a big win for the future of the Mojave desert tortoise.

LEARN MORE

Report: Development of Dual-Purpose Desert Tortoise Crossing Culverts
Article: How does a desert tortoise cross the highway? It can use a ‘wildlife underpass’

U.S. HIGHWAY 20
HARPER TO JUNTURA

Road | U.S. Highway 20
Structures | To be determined
Target Species | Mule deer

U.S. Highway 20 between Harper and Juntura in eastern Oregon bisects one of the state's highest density mule deer winter ranges. This area within the Malheur River watershed has seen a mule deer population decline of 25-42% over the last four years. In addition to wildfire activity and the spread of invasive plant species, wildlife-vehicle collisions (WVCs) along highway 20 in the Malheur River Canyon have contributed to the deer's population decline. In 2019, the Burns Paiute Tribe, which resides in the area and greatly values populations of deer, elk, and other species, secured Bureau of Indian Affairs funding to work with stakeholders to identify measures to improve habitat connectivity for mule deer and other species along this stretch of Highway 20. The Tribe will lead the crafting of a wildlife habitat connectivity assessment, which will involve working with state and federal agencies, as well as holding public meetings, to determine how and where wildlife move.

LEARN MORE

Article: Guest Blog by Calla R. Hagle, Natural Resources Director for the Burns Paiute Tribe, "How to Address a Wildlife-Vehicle Collision Hot Spot"
Report: Oregon 2020 Action Plan for SO3362

A key component of this assessment will be the identification of recommended safe wildlife passage mitigation measures aimed at reducing WVCs along U.S. 20 between Harper and Juntura. Recommended mitigation may include retrofitting of existing culverts and bridges to better accommodate wildlife as well as proposed new wildlife mitigation infrastructure. The Tribe's assessment and the adoption and implementation of recommended mitigation measures will be a big win for mule deer and other wildlife in this region.

Other ongoing conservation efforts in this region include a partnership project between the Oregon Department of Fish and Wildlife's (ODFW) Mule Deer Initiative and the Bureau of Land Management to improve shrub cover across 750 acres in a nearby fire scar, riparian area restoration by the Burns Paiute Tribe, and monitoring of mule deer GPS collar data by ODFW and the Tribe. In combination with construction of recommended wildlife infrastructure, these ongoing efforts should reduce WVCs and improve habitat connectivity, enabling deer and other species to thrive long into the future.

U.S. HIGHWAY 97 UNDERPASS

Road | U.S. Highway 97
Structures | Underpass
Target Species | Mule deer

In 2012, the Oregon Department of Transportation (ODOT) built a wildlife underpass on Highway 97 just south of Bend, Oregon, near Lava Butte. Faced with peak summer traffic volumes of up to 24,000 cars per day, the crossings were included in a planned project to double, or "twin," the increasingly busy highway's capacity from 2 to 4 lanes. Highway officials installed the underpass and associated fencing to help ensure safe passage for thousands of mule deer that cross U.S. 97 in the spring to access their summer grazing range in the Cascade Mountains west of the highway, and then back again in the fall to reach their winter range east of the highway. Since its completion in 2012, wildlife-vehicle collisions (WVCs) have dropped by more than 90%, a clear win for both people and wildlife. While the underpass was designed with mule deer in mind, more than 40 species, including black bear, bobcat, elk and squirrels have been documented using the underpass since monitoring began in 2013. Like most effective wildlife crossing infrastructure, there was a significant upfront cost; however, based on the average cost of a WVC with a deer in Oregon ($6,633 in 2012), the crossings are expected to pay for themselves within 12 years.

LEARN MORE

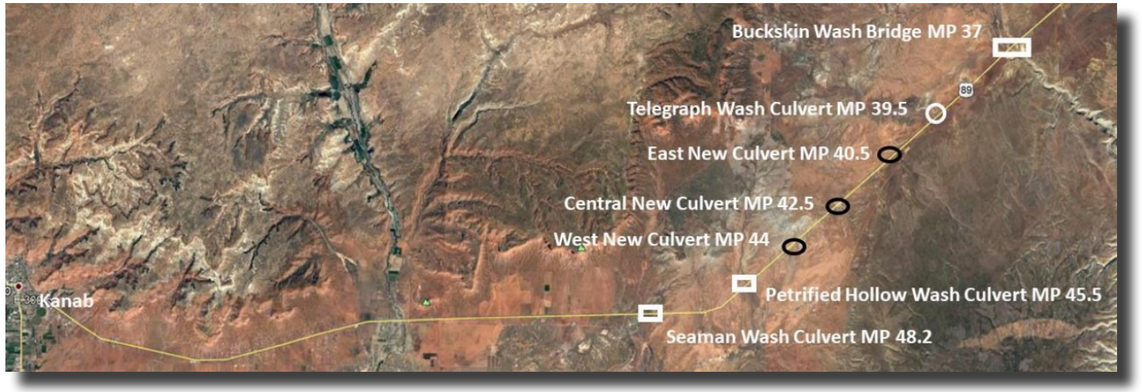
Website: Strategy Spotlight: US-97 Wildlife Crossing
Article: Another Wildlife Crossing Planned for Highway 97

ODOT is currently moving forward with plans for a second wildlife underpass along US-97 near Gilchrist, as part of the next phase of the twinning project. Over 250 crashes involving deer and elk were reported between 2010 and 2017 along the targeted 10-mile stretch. A public-private partnership has raised more than $500,000 in funding for the project, including $240,000 from the Oregon Department of Fish and Wildlife (ODFW); $110,000 from the Oregon Hunters Association; $75,000 from the Oregon Wildlife Foundation; and $20,000 from the Mule Deer Foundation. Statewide, the cost of WVCs is estimated to exceed $44 million, and in June 2019, Governor Kate Brown signed the bipartisan Oregon Wildlife Corridors bill into law. Among other things, the new law calls for state agencies to identify where wildlife corridors cross roadways, and to create a Wildlife Corridor Action Plan aimed at mitigating key WVC hot spots in the state.

U.S. HIGHWAY 89
KANAB-PAUNSAUGUNT PROJECT

Road | U.S. Highway 89
Structures | Seven underpasses
Target Species | Mule deer

In 2013, a network of seven underpasses was completed to funnel the prized Paunsaugunt mule deer herd across U.S. Highway 89 in Southern Utah. This herd of about 5,000 deer travels up to 80 miles each way on their annual migration, one of the longest migrations in the state. The underpasses, all located in Grand Staircase Escalante National Monument, keep deer off this busy highway as they navigate between their winter range on Arizona's Kaibab Plateau and their summer range in Southern Utah. Three underpasses already existed and were retrofitted to better suit wildlife; three underpasses were new construction; and one bridge was retrofitted. This network of underpasses, one of the first of its kind in the region, has proven remarkably successful. Prior to the project, this stretch of highway saw ~130 deer-vehicle collisions per mile per year.



Following construction, more than 78,000 successful mule deer movements were detected within the 12-mile project area. It is notable that acceptance and use of the crossings didn't happen overnight; rather, they roughly tripled over the 5-year monitoring period, increasing from about 8,000 in 2013-14, to nearly 24,000 in 2017-18. This project was possible due to a successful public-private partnership involving the Utah Department of Transportation, Utah Division of Wildlife, Arizona Game & Fish Department, Grand Staircase Escalante National Monument, Kane County, Mule Deer Foundation, and Sportsmen for Fish and Wildlife.

LEARN MORE

Article: Utah wildlife crossing set to save hundreds of migrating deer
Report: Post Construction Monitoring

PARLEYS SUMMIT OVERPASS

Road | Interstate 80
Structures | Overpass
Target Species | Ungulates

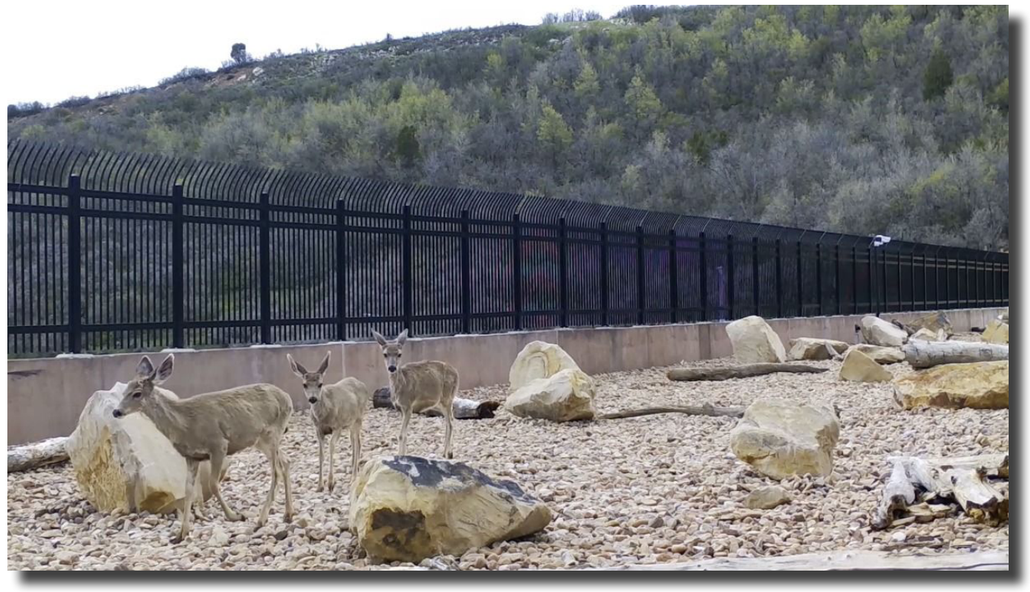
The wildlife overpass at Parleys Summit was completed in late 2018 and is already seeing promising results for people and wildlife. Since its installation, wildlife camera monitoring data reveal that deer, elk, moose, cougar, bobcat, bear, and marmots are just a few examples of the species using the overpass. In the two years prior to its construction, the Utah Department of Transportation (UDOT) reported that more than 100 animals were hit and killed by motorists on this stretch of Interstate 80 between Salt Lake City and Park City.

Known to locals as 'slaughter row,' the history of high crash rates in the area ultimately spurred formation of a local non-profit called Save People, Save Wildlife (SPSW). Devoted to advocating for safety measures along I-80, SPSW has raised funds to pay for wildlife fencing and other safety elements associated with the overpass; its volunteers also regularly engage in community outreach and education about the importance of improving human-wildlife coexistence. SPSW is also part of a public-private partnership working together to build the crossing. Public partners include UDOT, the Utah Division of Wildlife Resources (UDWR), and Summit County.

Spanning six lanes of traffic, the Parleys Summit wildlife bridge is about 50 feet wide and 320 feet long. Part of a $22 million planned transportation project that included the addition of a climbing lane for trucks, the $5 million overpass was supported by a federal grant for wildlife mitigation.

LEARN MORE

Video: Parleys Canyon Wildlife Overpass in 2020
Website: Save People, Save Wildlife



I-90 AT SNOQUALMIE PASS

Road | Interstate 90
Structures | Overpasses and underpasses
Target Species | Ungulates, carnivores, small mammals, reptiles, amphibians and fish

When the need arose to widen and improve 15 miles of Interstate 90 near Snoqualmie Pass, a diverse group of public and private partners came together to provide safe passage for the area's diverse array of wildlife in the face of encroaching human development. The longest interstate highway in the country, I-90 runs east-west from Boston to Seattle and serves as a critical transportation corridor for freight and people. This 15-mile stretch of road just outside Seattle, is where I-90 crosses the Cascade Mountain Range at Snoqualmie Pass, a relatively intact and therefore vital alpine habitat corridor for animals, most of whom tend to move north-south along the range. By effectively splitting the Cascades in two, I-90 had constituted a virtually insurmountable barrier for wildlife movement, until now. The network of more than 27 planned crossing structures includes two large overpasses and three large underpasses strictly for terrestrial wildlife that do not include water passage, as well as 21 underpasses that include streams.

These structures are designed to mimic the surrounding ecosystem and include native plant communities that stretch the length of the crossings, wetlands, and streams, reconnecting previously severed habitat. The structures will serve as a way for many wildlife species – including but not limited to elk, deer, mountain goat, wolverine, bear, cougar, western toad, cascade frog, Pacific giant salamander, pika, and river otters – to safely cross from one side of the highway to the other, with barely a change in scenery. The monitoring program and I-90 Wildlife Watch has documented thousands of animals using the completed structures, including a Pacific giant salamander captured using one of the larger, channelized underpasses within five days of its completion! As of early 2020, over 7,000 unique crossings had been detected, and those numbers are only expected to rise. This project has a commitment to long term monitoring in partnership with universities such as Central Washington University to conduct detailed research on increased connectivity for a variety of species.

LEARN MORE

Film: Cascade Crossroads
Website: Conservation Northwest's I-90 Wildlife Corridor Campaign
News and Updates: WSDOT Facebook Page

BUTLER CREEK

Road | U.S. Highway 97
Structures | Underpass
Target Species | Ungulates, carnivores, small mammals, reptiles, amphibians and fish

In 2012, the Butler Creek Bridge was installed along U.S. Highway 97 north of Goldendale in southcentral Washington. This project is a great example of how to improve both fish and wildlife passage as part of a bridge or culvert replacement project. Originally 10-feet in diameter, this undersized culvert constricted the channel of the stream it carried, thereby increasing water velocity, and also had a gradient that was too steep for fish passage. When it became apparent that fish were not moving through it, the culvert was replaced with a 65-foot span bridge. Because the culvert sat along a stretch of U.S. 97 that sees very high rates of motorist crashes involving deer, the bridge not only was designed significantly wider and taller than the original culvert, in order to permit the creek to span its full, natural width, but it also allowed enough room to install a pathway underneath the bridge that would encourage terrestrial wildlife to follow that pathway to cross under this busy rural highway, rather than crossing at-grade.

LEARN MORE

Website: WSDOT - Habitat Connectivity
Website: WSDOT - Improving Wildlife Habitat Connectivity

Two-lane highways of medium traffic volume in rural areas, such as this one, tend to have relatively high WVC rates. This is likely because traffic volume has not yet risen to the level of creating a complete and total barrier (deterring wildlife from even attempting to cross); thus, wildlife nonetheless continue to attempt to cross despite the moderate traffic levels. Wildlife-proof fencing was also installed along each side of the highway in both directions from the bridge to funnel wildlife to the structure. Double-cattle guards were installed along side roads to prevent wildlife from entering the fenced portion of the main roadway, and wildlife "jump outs" or "escape ramps" – that allow wildlife who intrude on the fenced portion of the highway to "escape" – were also constructed. The mountain lions pictured above are seen utilizing a jump out. Since the structure's completion, wildlife-vehicle collisions (WVCs) within a half mile in either direction of the structure have dropped by approximately 81%. A wide array of wildlife have been documented using the structure, including bobcat, the endangered western gray squirrel, mule deer, snowshoe hare, mountain lion and wild turkey. This structure improves aquatic habitat and enhances terrestrial wildlife passage, greatly reducing WVCs, all at a relatively low cost.

TRAPPER'S POINT CROSSING COMPLEX

Road | State Highway 191
Structures | Two overpasses, six underpasses
Target Species | Pronghorn antelope and mule deer

The Trapper's Point Project is located near Pinedale in western Wyoming along the "Path of the Pronghorn," a 6,000-year old migration corridor used by pronghorn antelope. This project includes two wildlife overpasses, six underpasses and 35 miles of associated wildlife-proof fencing aimed at providing safe passage for pronghorn antelope and mule deer as they travel between their winter range in Wyoming's Red Desert to their summer range in Grand Teton National Park. The Trapper's Point Project was spurred by sustained increased in traffic volumes along this predominantly rural roadway, caused in part by the state's booming natural gas industry. Although mule deer in Wyoming have successfully used wildlife underpasses, pronghorn in contrast appear to be particularly averse to using concrete box underpasses or culverts, which tend to have less natural light. The final project design thus included a mix of overpasses and underpasses to provide both pronghorn and mule deer safe passage, while also allowing other resident species to safely cross this busy highway. Within the first three years after completion, pronghorn and deer – as well as elk, wolf, bear, and even sage grouse – used the structures to cross the highway more than 60,000 times. This effort was led by Wyoming Department of Transportation (WYDOT) and Wyoming Game and Fish Department (WGFD), in collaboration with other agencies and organizations including the Green River Cattle Association.

WYDOT estimates that wildlife-vehicle collisions (WVC) have dropped by 80% for the target species, and that the $9.7 million project will pay for itself within 17 years as a result of savings due to fewer wildlife deaths and damage to people and property. In addition to its on-the-ground work, WYDOT and WFGD co-hosted the state's first Wildlife and Roadways Summit in April 2017. The Summit inspired formation of the Wyoming Wildlife and Roadways Initiative, a collaborative effort led by WGFD and WYDOT to improve public safety, reduce loss of lives and property, and reduce impacts to the state's treasured wildlife heritage. Wyoming was also one of the first states to create a license plate to raise funds to pay for wildlife crossing structures, and in February 2020, Governor Mark Gordon issued an executive order that sets forth a science-based approach for identifying and conserving potential migratory wildlife corridors within the state.

LEARN MORE

Images: Trapper's Point Wildlife Overpass Webcam
Article: Trapper's Point Engineering Award
Website: Wyoming Wildlife and Roadways Initiative
Website: Governor Gordon signs Wyoming Mule Deer and Antelope Migration Corridor Protection Executive Order

TOGWOTEE PASS CROSSING STRUCTURES

Road | U.S. Highway 26
Structures | Underpasses
Target Species | Many native species including ungulates, carnivores, and fish

A series of wildlife crossing infrastructure was installed along U.S. Highway 26 as it crosses Togwotee Pass, as part of a larger rebuild project for this highway. The structures in this corridor include: 2 bridge extensions to accommodate undercrossing, 5 undercrossing box structures for winter snowmobile crossings and summer wildlife crossings, 2 fish passage structures, a buried bridge for wildlife undercrossing, a 50' radius arch culvert undercrossing, and upsized drainage culverts (also used for small critter crossings) throughout the 38 mile corridor. This stretch of the Centennial Scenic Byway, known as "Togwotee Trail," is flanked by rich wildlife habitat and serves as a main route to access Grand Teton and Yellowstone National Parks. Because of this highway's location within the Greater Yellowstone Ecosystem, one of the last largely-intact ecosystems in the nation, it is vital that this travel corridor has as little impact on the natural landscape as possible, hence the inclusion of wildlife underpasses in the road design. Robust public-private partnership efforts made this project possible and effective. Wyoming Department of Transportation, U.S. Forest Service, Wyoming Department of Fish and Game, and multiple conservation non-profit organizations collaborated to make this project a reality. Each of the structures is focused on different target species, though all structures see use by many different species. Grizzly and black bears, wolves, deer, elk and moose, and river otters and cutthroat trout are a handful of the species that benefit from these crossing structures. People benefit, too, as driver safety is improved when animals have their own dedicated tunnels to cross the road, without having to dodge fast-moving vehicles.

Native shrubs were planted strategically near the crossings. As they grow in size, this vegetation will not only help provide smaller critters cover, but will also better direct wildlife towards the crossings. Completed in 2013, the project won a number of transportation planning awards for its innovation, including an America's Transportation Award for best use of innovation in a medium-sized project. The project also has been honored by the U.S. Forest Service with an award for outstanding partnership to preserve, conserve and enhance the highway corridor's natural, scenic, visual and wildlife resource values.

LEARN MORE

Website: WYDOT Wildlife and Fisheries

STATE	PROJECT	IMAGE CREDIT
AZ	Highway 93	ALL IMAGES: *Arizona Game and Fish Department*
AZ	Oracle Road	AERIAL; DEER: *Arizona Game and Fish Department* TORTOISE: *Jesse Espinosa, Granite Construction* MAP: *Arizona Game and Fish Department - Beier, P., E. Garding, and D. Majka. 2006. Arizona Missing Linkages: Tucson – Tortolita – Santa Catalina Mountains Linkage Design. Report to Arizona Game and Fish Department. School of Forestry, Northern Arizona University*
CA	Sierra National Forest	STRUCTURE; SIGN: *Stephanie Barnes, United States Forest Service* TOAD: *Cheryl Brehme, United States Geological Survey*
CA	Liberty Canyon	ALL IMAGES: *Living Habitats LLC/National Wildlife Federation*
CO	Highway 9	STRUCTURE: *Laramie Maxwell* PROJECT MAP & WILDLIFE IMAGES: *Colorado Parks and Wildlife*
CO	I-70 East Vail Pass	LANDSCAPE: *Summit County Safe Passages Plan* MAP: *East Vail Pass Feasibility Study* ELK: *Mike Mauro, United States Fish and Wildlife Service* LYNX: *Steve Torbit, United States Fish and Wildlife Service*
ID	Cervidae Peak	TOP: *Idaho Department of Transportation* BOTTOM: *Federal Highway Administration*
ID	Lemhi River	STRUCTURE: *Idaho Transportation Department* WILDLIFE CAMERA: *Idaho Fish & Game*
MT	Highway 93 North	IMAGE: *Montana Department of Transportation*
MT	Highway 200	ALL IMAGES: *Montana Department of Transportation*
NM	Tijeras Canyon	STRUCTURE & ANIMAL DETECTION SYSTEM: *New Mexico Department of Transportation* MAP: *New Mexico Public Broadcasting Service*
NM	Highway 550	ALL IMAGES: *New Mexico Department of Transportation*
NV	Pequop Crossings	STRUCTURE: *NineCaribou Productions, still from (Re)Connecting Wild* MAP: *Nevada Department of Transportation*
NV	Mojave Desert	TORTOISE: *Stantec* STRUCTURE: *United States Fish and Wildlife Service*
OR	Highway 97	STRUCTURE: *Oregon Department of Transportation*
OR	Highway 20	IMAGE: *Burns Paiute Tribe*
UT	Parleys Summit	STRUCTURE: *Utah Department of Transportation*
UT	Highway 89	STRUCTURE: *Chris Detwick* MAP: *Utah Department of Transportation*
WA	Butler Creek	ALL IMAGES: *Washington State Department of Transportation*
WA	I-90 Snoqualmie Pass	STRUCTURE: *Washington State Department of Transportation*
WY	Trapper's Point	IMAGE: *Wildlife Conservation Society*
WY	Togwotee Pass	ALL IMAGES: *Wyoming Department of Transportation*

PROJECT IMAGES

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AZ	Oracle Road	Jeff Gagnon, *Arizona Game and Fish Department*
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CA	Liberty Canyon	Beth Pratt, *National Wildlife Federation*
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CO	I-70 East Vail Pass	Michelle Cowardin, *Colorado Parks and Wildlife* Julia Kintsch, *ECO-Resolutions* Tehri Parker, *Rocky Mountain Wild* Paige Singer, *Rocky Mountain Wild*
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NM	Highway 550	James Hirsch, *New Mexico Department of Transportation*
NV	Pequop Crossings	Nova Simpson, *Nevada Department of Transportation* Cody Schroeder, *Nevada Department of Wildlife*
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OR	Highway 20	Cidney Bowman, *Oregon Department of Transportation* Calla Hagle, *Burns Paiute Tribe*
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UT	Highway 89	Daniel Olson, *Utah Division of Wildlife Resources*
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WA	I-90 Snoqualmie Pass	Scott Downes, *Washington Department of Fish and Wildlife* Glen Kalisz, *Washington State Department of Transportation*
WY	Trapper's Point	Darin Martens, *U.S. Forest Service / Wyoming Department of Transportation / FHWA*
WY	Togwotee Pass	Darin Martens, *U.S. Forest Service / Wyoming Department of Transportation / FHWA*

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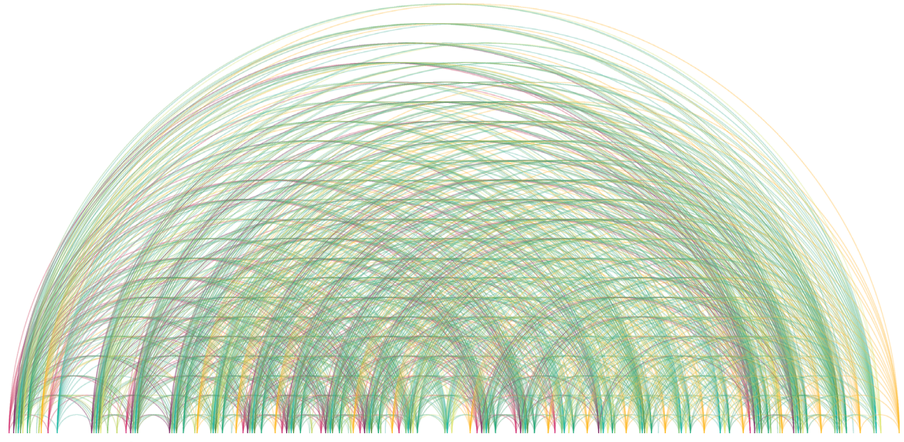
ARC

NEW THINKING | NEW METHODS | NEW MATERIALS | NEW SOLUTIONS



About ARC Solutions
ARC Solutions is an international network whose mission is to identify and promote leading-edge solutions to improve human safety, wildlife mobility and long-term landscape connectivity. We do this by fostering innovation in the placement, design and construction of wildlife crossings. We know these are solutions that work, and we seek to share this knowledge to build support for safe passage. ARC is a partnership network of nonprofit, private, public, academic, and philanthropic partners in the U.S. and Canada and is fiscally sponsored by the Center for Large Landscape Conservation in Bozeman, Montana.

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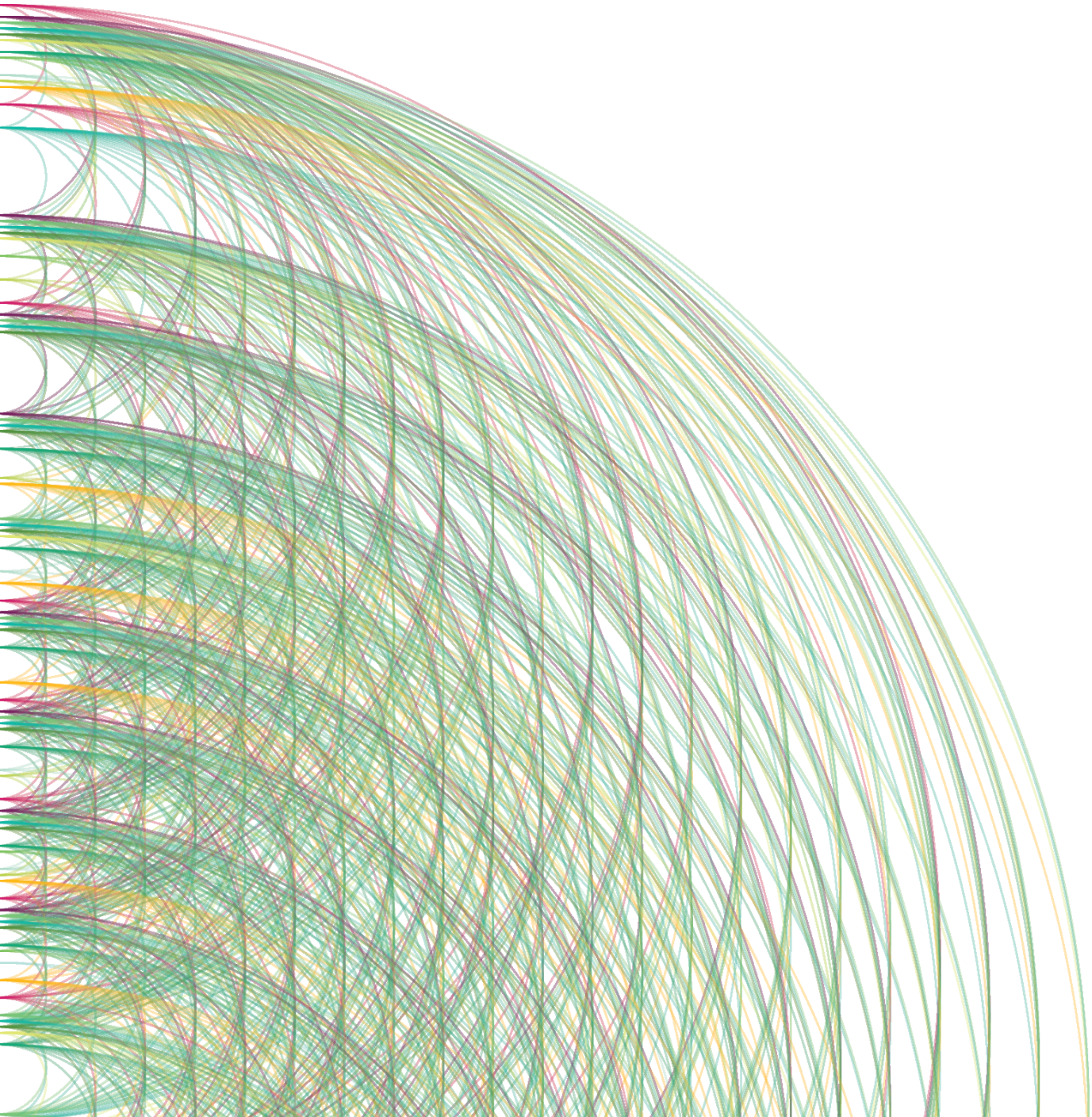

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