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Building a Better Crosswalk -- for Moose, Bear and Elk

By LAURA PETERSEN of **Greenwire**

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The Colorado Division of Wildlife has a special moniker for Interstate 70, the 133-mile freeway bisecting the state and cutting a motor vehicle thruway across the Rocky Mountains.

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"I-70 was pretty much a Berlin Wall for wildlife in many places," said Bill Andree, a state district wildlife manager. "Vail Pass in and of itself has the dubious distinction of having most every species that exists in Colorado hit and killed on it."

The casualties have included two threatened Canada lynx killed within two miles of each other, enough deer to literally fill a dump truck every month, and the first known gray wolf that had made its way down from Yellowstone National Park.

"That was our first realization in the Southern Rockies that not only are wolves coming back, they are traveling hundreds and hundreds of miles and I-70 was what stopped her," said Monique DiGiorgio, a conservation strategist for Western Environmental Law Center.

These collisions are not just deadly for the animals; they are devastating for motorists as well. Between 1 million and 2 million wildlife-vehicle collisions occur every year in the United States, a 50 percent increase in the last 15 years. That adds up to more than \$8 billion in accident-related costs, including damage to vehicles and insurance claims -- but it does not begin to account for human lives lost.

Fences have been installed along portions of I-70 to keep animals off of it, dramatically reducing the number of large animals killed and improving motorists' safety, Andree said. But fences, like roads, have the effect of fragmenting habitat, limiting how far species can travel to find food, water and mates. Research of populations on either side of a highway has even found genetic differences between the isolated groups.

"The more fragmentation, the more likely these populations will go extinct locally," said Tony Clevenger, a wildlife biologist with the Western Transportation Institute at Montana State University.

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Underpasses and overpasses, in combination with the fences, provide a solution that not only addresses the safety concerns for motorists, but also maintains habitat connectivity for animals.

There are thousands of underpasses in North America, but only a handful of wildlife overpasses. The first two were built in Canada's Banff National Park across the Trans-Canada Highway in the mid-1990s.

Clevenger has studied the two overpasses and 22 underpasses in Banff for the past 14 years. Since 1996, animals have used the crossings more than 240,000 times, he said, and wildlife-vehicle collisions have dropped between 80 percent and 95 percent.

"These structures are functional," Clevenger said. "You can imagine how much mortality there would be if an animal had to cross the highway 200,000 times."

While effective, the overpasses cost upwards of \$10 million to \$12 million -- a hard sell for state transportation departments with aging roadway infrastructure and limited budgets to make repairs. So Clevenger proposed hosting a competition to see if the wildlife bridges could be built for half the price by redesigning the structures from the bottom up.

The ARC International Wildlife Crossing Infrastructure Design Competition began in 2008 and will conclude this Sunday, when the winner is announced at the Transportation Research Board annual conference in Washington, D.C.

The Western Transportation Institute partnered with the Woodcock Foundation in New York and several state and federal agencies to sponsor the competition, which will award a \$40,000 prize to the team with the winning design.

A fresh look

One overriding design principle for all the competitors was to scale the projects appropriately, thus driving down costs without compromising their functionality for wildlife.

Nina-Marie Lister, the competition adviser, noted that the Banff wildlife crossings were so expensive because they were essentially standard concrete overpasses with a layer of soil and plants on top. "They are really not designed for two bears and a moose. They are designed to have 18-wheel dump trucks on top of them," Lister said.

The ARC challenge was to design a wildlife overpass for West Vail Pass, Colo., with materials that are lighter and more sustainable. Modularity was also a key criterion, so the structures can be easily reproduced, moved if necessary, and installed with less disruption to highway traffic.

"Right now structures are built to stay in place for 75 years," said Rob Ament, road ecology program manager for WTI. "What about climate change and in 50 years, suddenly the wildlife has shifted? Could we also make these lightweight and mobile enough to move?"

Thirty-six proposals were submitted by teams of engineers, architects, landscape architects and ecologists representing more than 100 firms from nine countries. Five finalists were selected in September, showing the breadth of what could be built for between \$7.5 million and \$12 million.

While one team emphasized sustainability by using beetle-killed timber to construct the bridge, others focused on modularity by using prefabricated concrete blocks that can be easily snapped together. Yet another team envisioned a red bridge, a color most animals

cannot see but will catch the attention of drivers who might be more observant of wildlife in the area.

"We focused on an overpass design because they are somewhat iconic," Ament said. "Motorists can drive over underpasses and never know they're there. But when they see that overpass, they realize the agencies have invested in maintaining connectivity as well as reducing wildlife-vehicle collisions. They totally understand what that overpass is there for."

The competition required the overpasses be designed and landscaped to provide a seamless transition between the habitat on either side of the highway and shield the animals from roadway light and noise, so they are more enticed to use them.

How do animals know to use the crossings?

First, fences are built along the sides of the highway to block passage except the designated overpass or underpass. From his research, Clevenger found animals like black bears and cougars prefer underpasses, because they are covered like they would be in their forest habitat. However, grizzly bears, deer and elk prefer the overpasses because they are more open and the animals can see across to the other side.

"Animals may not use them or use them very rarely initially," Clevenger said. "But through the long-term monitoring we've been able to do, we can see there is this adaptation period or learning curve. It takes animals time to find them, feel secure using them, and then use them on a regular basis."

Putting it on the ground

West Vail Pass was chosen for the design competition because of its historically high rates of wildlife-motor vehicle collisions, and its high profile for visitors traveling to the snow resort towns in the mountains.

However, there is no guarantee that the winning design, or any wildlife overpass, will be built at the site. Thirteen sections of highway have been identified as wildlife-blocking corridors that state agencies have agreed need to be redressed. A comprehensive plan for the entire I-70 corridor is currently under review, which includes wildlife crossings as one potential mitigation measure.

Stacey Stegman, spokeswoman for the Colorado Department of Transportation, said the state has no firm plans for incorporating such corridors along the highway, but she added, "It's an intriguing idea and one that we're interested in getting information from and learning more about."

"What happens in the future is truly a guess because we don't know how or when or if this will ever get built or how it will be paid for," she added.

Beyond the logistical hurdles of designing and siting wildlife crossings, Stegman said transportation planners face public skepticism, and even opposition, to such proposals.

"Every time a story like this runs, we get complaints from the public that 'we can't believe you would consider spending that much on a wildlife bridge,'" she said. "And we get the opposite, too: 'Of course you should do this, it's the right thing to do.'"

Lister said the public safety and economic benefits associated with avoiding wildlife-vehicle collisions usually win people over. Car owners can expect to pay an average of \$600 in vehicle damages from a deer collision and up to \$30,000 for a moose collision, he said.

And while the overpass design competition was tailored for the West Vail Pass site, all of

the entries could be adapted to other locations.

"We hope all five of those designs will spark the imaginations of the DOTs and get them thinking about how to build these structures more lightly, more flexibly and in multiple networks across the country," Lister said.

'Road ecology'

The ideas behind wildlife overpasses come from an emerging field of inquiry known as "road ecology," which studies the effects roads have on their surroundings. The term was coined in 2003 by Harvard landscape ecologist Richard Forman, who co-wrote a book on the subject with Clevenger.

"[Forman] started realizing all the effects the roads have, not just on the species, but on the environment in terms of chemistry, hydrology, plants and animals, soils and nobody was looking at it," Clevenger said.

Roads have a direct effect on 15 percent to 20 percent of U.S. land area and are identified as a major threat for 21 federally threatened or endangered species, including bighorn sheep, desert tortoises and the San Joaquin kit fox. While essential for everyday life, Clevenger said there is increasing public awareness about the damage they can do to ecological systems.

"It's really blossoming and growing, not only researchers, but the public are becoming more concerned about highway effects," he said.

For example, the Western Governors' Association launched an initiative in 2007 to identify and protect vital wildlife corridors. The 17 member governors have pledged to map by 2013 important corridors and habitat to help future transportation and energy planning. Madeleine West, a WGA program manager, said maintaining habitat connectivity and protecting wildlife is an important issue for the association, which endorsed the ARC competition.

"If this competition can identify how you can build cheaper, more efficient wildlife crossings, that's exactly what our state agencies need," West said.

Last month, Wyoming approved two structures to help pronghorn antelope cross Highway 191 from the Upper Green River Valley into Grand Teton National Park. After failing to receive federal grants for the passes, the state allocated \$10 million of its own money to build a series of underpasses and the two overpasses along 23 miles of highway.

Advocates are also working to minimize impacts from new roads by pushing legislation that would require wildlife information to be incorporated early into the planning process.

"What we're looking at is, 'How do we ensure that process integrates the best available wildlife movement data from the very beginning?'" said DiGiorgio, the conservation strategist with the Western Environmental Law Center. "There is nothing that we see in statute that really requires that departments of transportation to do that."

While it may be awhile before wildlife crossings become mainstream, multiple agencies laud the potential benefits they could provide. Cost-effective wildlife crossings that maintain habitat corridors address a major concern of public land managers, enabling them to focus on other equally valued activities, said Dave Neely, a Forest Service ranger for the White River National Forest.

"For something like this, there may actually be a solution," Neely said. "So it isn't roads

or wildlife, maybe it's roads and wildlife."

[Click here](#) to view the finalists' designs.

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