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No one knows exactly when the first elk wandered into the median around milepost 142, but after a few days they were hard to ignore. By that point, there were 25 or 30 of them spread over three miles, trapped, cars and trucks streaking by them on the interstate that flanked them north and south.

In winter it isn't unusual to spot a mule deer or two along I-70 between Eagle and Gypsum. They hover near the highway, seeking easy forage, and some seem so familiar with the hundred-yard-wide median that they might have grown up there. But a couple dozen ungulates at once is another matter entirely. The elk had come from the south side of the road in February, breaching the wildlife fencing that was supposed to keep them away. Some later found an exit; some didn't.

At least six were hit by cars over the next few weeks as they tried to escape. The calls and e-mails poured in to state highway and wildlife offices. One angry motorist sent pictures of dead elk by the roadside, demanding action. Officials from the Colorado Department of Transportation (CDOT), the Division of Wildlife and local agencies got together to assemble an evacuation plan, one that would involve fifty people and practically every oversized snowplow and emergency vehicle in Eagle County.

On March 6 a seven-mile stretch of I-70 was shut down for two hours for the operation. The wapiti wranglers cut holes in the deer fence and steered the herd through them. A few overshot the exits and kept heading west, only to be turned back by big rigs blocking their path at spanning bridges. Eventually nine elk and two deer were removed; one or two other deer outmaneuvered the wranglers and trotted away in the median, left to find their own way back to safety.

Costly as it was, the roundup near Eagle wasn't the worst traffic incident involving Colorado wildlife so far this year. In January a herd of elk tried to cross I-70 in the foothills west of Denver, near the Beaver Brook exit — a frequent and posted migration area. Although it was one o'clock in the morning, there was still more than enough traffic to put a stop to that. A semi and two cars greeted the herd. Amazingly, no motorists were injured, but sixteen elk carcasses had to be scraped off the road.

When four-legged creatures meet up with four-wheeled hunks of metal, the creatures are usually the losers. Not that anybody ever wins; nationally, wildlife-vehicle collisions cause hundreds of human fatalities and thousands of injuries every year. And they're becoming more common, as development spurs more traffic in once-remote areas. According to the Western Transportation Institute, the number of reported collisions increased by 50 percent **continued on page 12**

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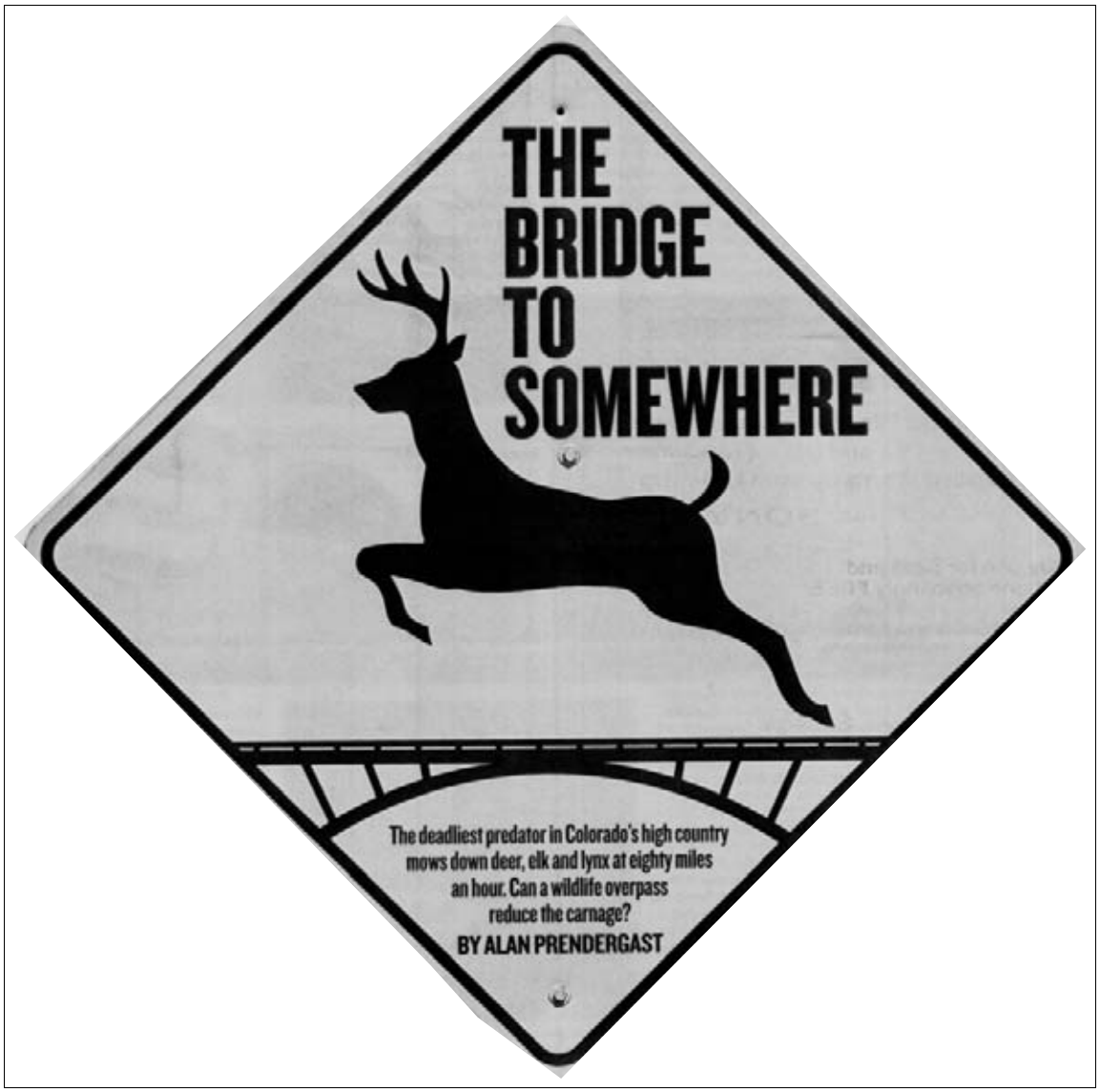

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## Wildlife

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had recorded thousands of images of wildlife — a teeming, largely nocturnal world of deer, elk, bears, coyotes and others on the fringes of the highway.

"We got a good sense of how active they were," says Paige Bonaker, a staff biologist at the Center for Native Ecosystems who worked on the project. By using hair snares, scat and track surveys and other methods, Bonaker was able to determine that there were additional animals in close proximity to the interstate, including pine martens, that weren't always picked up by the cameras.

Among the busiest crossing points were areas down the valley on the west side of the pass, closer to Vail, where high bridge spans had left roomy passage underneath. The bridges hadn't been built with wildlife in mind, but they worked perfectly; the four-legged pedestrians had little problem moving at will through the area.

So why build an expensive overpass further up the pass? Because the bridges end as you head east, leaving miles of deadly at-grade crossing. Because large animals prefer the openness of an overpass to the confined space of a culvert. Because an interagency panel convened to study the issue identified milepost 187.4 as the ideal site, in terms of vegetation, topography, a relative lack of a human recreational presence (compared to, say, the top of the pass) and high usage by wildlife.

"The hardest thing to get people to understand is that you need a series of crossings to increase effectiveness," says DiGiorgio. "They should be regularly spaced along the roadway and tied together by fencing. We need to apply the science in the right way so we don't patchwork our wildlife crossings. In this case, with the investment in one overpass in the right place, you can tie the whole system together."

Peter Kozinski, CDOT's project manager for the I-70 mountain corridor, says the federal earmark funds have allowed the agency to progress deep into preliminary design. Even with the success of vegetated bridges in Banff, the logistics of building one over the interstate at 10,000 feet are daunting. The bridge has to bear not only the weight of enough soil to accommodate evergreens, but a tremendous snow load, too; Vail Pass gets up to 500 inches of snow a year. It has to be properly bermed and shield its users from alarming headlights from traffic below, while not adding to icy conditions on the roadway.

"We want it to be a stellar success," Kozinski says. "But there are still lots of questions out there. For one thing, there isn't any money that's been identified to build this thing."

CDOT executive director Russ George, the former head of the Colorado Department of Natural Resources, has been supportive of the idea of improving wildlife crossings — more so, certainly, than his predecessor, Tom Norton, who once complained to a

## The Kill Zones

Colorado reported 35,302 collisions between animals and vehicles from 1986 through 2004. The actual number may be much higher, since the available records are sketchy — in 60 percent of the collisions, the species involved isn't even identified — and many minor accidents involving wildlife aren't recorded. The highest incidence of collisions resulting in human injury occur in the fall, when many large game animals are moving from summer to winter range. Drawing on available data, the Southern Rockies Ecosystem Project identified the following Colorado roads as "extremely hazardous" for motorists and wildlife:

**I-70 — Floyd Hill/Mt. Vernon Canyon:** One semi, sixteen dead elk, January 23, 2009.

**U.S. 285 — Morrison:** Busy interchange, for both cars and critters.

**U.S. 160 — Durango to Bayfield:** Seventy percent of all accidents due to wildlife.

**U.S. 160 — Durango to Mancos:** Yes, it's just as bad heading west as east.

**U.S. 550 — Durango to Montrose:** Heading north out of Durango isn't any better.

**I-25 — Castle Rock to Larkspur:** One of the last undeveloped stretches of the Front Range, hence one of the most dangerous.

**State highways 82 and 133 — Glenwood Springs to Marble:** A corridor for celebrities, large ungulates and other exotics.

**State Highway 36 — Boulder to Lyons:** Commuter central.

**I-70 — Eagle:** Scene of the Great Wapiti Wrangle of 2009.

Other roads to drive with care because of high rates of animal-vehicle collision: SH 119 to Blackhawk, SH 9 between Frisco and Breckenridge, U.S. 285 through Park County.

**— Prendergast**

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a staggering expansion of the ski industry, a few pioneering biologists and wildlife advocates were already studying the state's rising rate of animal-vehicle collisions and pushing for better barriers and crossing designs. Yet over the past fifteen years or so, the greatest strides in the field have been made outside Colorado.

Banff National Park in Canada has reduced collisions drastically by building a series of 22 wildlife underpasses and two overpasses, combined with gates and escape ramps, along the Trans-Canada Highway; since 1996, the system has logged 186,000 crossings by eleven different species of large mammals. Arizona has invested in elaborate fencing systems to help guide wildlife across its major interstates. New Mexico has used electrified fences and underpasses to steer deer across I-40 east of Albuquerque.

Colorado's most recent contribution to the emerging technology can be found on U.S. 160 east of Durango, in a one-mile stretch that has historically had one of the highest animal-vehicle collision rates in the state. CDOT has buried cables along the road shoulder that sense changes in the electromagnetic frequency on the surface. Such cables have been used to detect intruders in high-security facilities, but never before for wildlife. When a large animal walks by, the sensors trigger flashing warning signs, alerting motorists that wildlife are attempting to cross. The $1.2 million project has only been in operation a few months, but officials hope the system will offer a cheaper, viable alternative in areas that don't readily accommodate an underpass.

"It's looking promising so far," says Mike McVaugh, the CDOT traffic and safety engineer overseeing the project. "The crews are seeing fewer carcasses."

Colorado's wildlife experts have benefited from studying what Canada and other states have done, as well as from detailed field work, examining critical crossing points and how the animals respond to different types of structures. It's not enough, they say, to stick a pipe under a highway and expect critters to come flocking to it.

"There's so much variability, even within a given species," explains Chris Haas, a senior biologist at SWCA Environmental Associates. "But we do have a lot of information about what works and what doesn't. You have to make sure that you're spending the money in the places that are most likely to be used."

Haas spent years studying various forms of wildlife crossings for California's highway department. More recently, as a research associate at Colorado State University, he was involved in an extensive CDOT study of Colorado crossings, including key linkage points on Wolf Creek Pass and U.S. 285. One new underpass on 285 near Conifer was a hit from day one, he says: "The mule deer were using it even before it officially opened."

The structure worked, he suggests, because it was built in the right place, with the right kind of vegetation and the needs of its customers in mind. Large ungulates, such as deer and elk, use culverts warily; they prefer the larger spaces under span bridges. "The longer the culvert is, the higher it needs to be to reduce the tunneling effect," Haas notes.

Some prey species want unencumbered sightlines and avoid going under bridges that have ledges where predators might lurk; others seek lots of cover. Bobcats and coyotes will use drainage-pipe culverts, but not if they get too small; yet Haas has also seen a moose use a culvert that was hardly optimal for its size. Many animals balk at a concrete surface or a submerged one. Then there are juveniles or transients, non-alpha members of a pack or herd, which might use structures that others don't.

A host of other considerations go into siting and design. Should fencing be used to help channel wildlife to the right spots? How long can the barrier be before animals attempt to breach it? And why are they trying to cross the road in the first place — in other words, where are they trying to go?

"Getting them across the road safely is just one part of the puzzle," says ecologist Kintsch. "If they don't have protected habitat on both sides, you don't have a linkage. You don't have a place for them to go. The land needs to be managed appropriately, too."

The argument for a wildlife bridge on I-70 near Vail Pass arises out of years of study by state agencies and environmental groups, seeking to identify the most advantageous points for breaching the Berlin Wall. The location is an ideal one, backers say, in part because of the presence of the relatively undisturbed Holy Cross and Eagle's Nest wilderness areas on either side of I-70.

"It isn't an area where you're going to see the most roadkill," Kintsch says. "It's not a major migratory pathway; you don't have huge numbers of deer and elk passing through on a seasonal basis. But it is a high-priority crossing for ecological reasons."

Three years ago, when she was a program director at the Southern Rockies Ecosystem Project (now part of the Center for Native Ecosystems), Kintsch helped coordinate a "citizen science" wildlife monitoring effort. Volunteers set up motion-triggered cameras at potential crossing areas along I-70 between Copper Mountain and Vail and returned frequently to swap out memory cards. By the time the project concluded in 2008, the cameras continued on page 16

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*Wall Street Journal* reporter that earmark projects like the wildlife bridge were a waste of money and "make my life miserable." But no single entity holds the key to all the federal and state boxes of revenue that finance highway projects, and backers of the bridge know that it's going to take some skillful political maneuvering and public campaigning to get the Vail overpass past the design stage.

DiGiorgio points out that the earmark money came out of a public-lands appropriation; in other words, it didn't take money away from a competing state highway project. It's possible, she suggests, that additional funding could come through other federal grants that wouldn't otherwise be available for state use. "The entire country is underfunded for transportation projects, but that doesn't mean we stop planning," she says. "It's constantly in flux, but projects are slowly getting funded. You never know what opportunities might arise."

Actually, if the crossing advocates have their way, Colorado will be the first state in the nation to boast not one but two wildlife bridges. Another overpass is being studied for the intersection of U.S. 6 and 119, the gateway to Blackhawk. The interchange was rebuilt in 1997 in response to increased traffic to the mountain casinos, but the new design has resulted in an increase in bighorn sheep kills as they try to follow Clear Creek. Engineers are studying the feasibility of an overpass spanning 119 for the sheep, about seventy feet wide, that would cost around $4 million to build.

"It's very much in preliminary design," says Tony DeVito, CDOT's Region One transportation director. "The biggest hurdle is identifying funding."

The cameras used in the citizen monitoring of wildlife on Vail Pass are now positioned across a much longer stretch of the interstate, from Golden to Dotsero. The Center for Native Ecosystems is using them to study how wildlife handle other potential crossings, but with only a few dozen cameras scattered over 120 miles, the information is somewhat fragmentary. The CNE's Bonaker says the group plans to launch a website in the fall that will allow I-70 motorists to report their own wildlife sightings.

A major challenge to the crossing planners is gathering reliable data about how wildlife actually move across the state — and the West. Highways may be the weakest link in most migratory patterns, but they're not the only one. The human population of the western half of the Colorado is expected to double by 2035, bringing more roads, development pressures and barriers.

"You need to think big," says Dave Theobald, a CSU geography professor who was part of the team that studied wildlife crossings and collisions for CDOT. "How are the wolverines going to get down there? Can they make it across this ravine or that river? The piece of going over the highway is needed, but it's not the only thing. You need a complete network of linkages."

Theobald has written extensively on shift-

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ing land-use patterns in the West, developing big-picture studies of the "wildlife-urban interface" as well as documenting specific impacts at ground level ("Map to the Future,"

October 4, 2007). He's currently working on a paper on habitat connectivity across the West but has found little detailed government research or policy on the issue. Yet momentum is building both at a regional and state level, with a western governors' task force and a blue-ribbon panel convened by Governor Bill Ritter both calling for increased protection of essential wildlife corridors.

"More work needs to be done at all levels," Theobald says. "We need to have finer-scale information about some of the critical species. For example, we have a lot of radio-collar telemetry data for lynx in Colorado, but we're not getting a real detailed understanding of how they're moving across the landscape."

The elusiveness of the lynx has proved to be a major frustration in the state's wildlife crossing research. The citizen cameras around Vail Pass captured plenty of images of elk and deer, but no lynx — in fact, no bobcats or mountain lions, either. Did that mean the cats weren't using the same crossings as other animals? Were they avoiding the road entirely? Or were the cameras failing to catch them?

The same mystery surrounds the CSU study, which failed to detect lynx using crossing structures on Berthoud Pass, Wolf Creek Pass and other key linkage points around the state.

"We had all these cameras on Wolf Creek Pass," recalls Chris Haas. "All told, we probably had close to 2,500 camera nights, if you multiply the number of nights they were working by the number of cameras. We never documented a single lynx. We did not have

lynx using the structures, but we know from the collars that they're crossing roads."

And we know from the roadkill that at least two of them didn't make it across I-70 west of Vail Pass.

If Colorado builds a wildlife bridge over I-70, will the lynx use it? The answer may come years from now, if ever. For now, the efforts to help wildlife cross the road are more...well, pedestrian. This summer, CDOT is completing work on an upgrade of fencing and ramps in the Eagle area, scene of the great wapiti wrangle of last winter, to provide more avenues of escape for animals that wander onto the highway.

**For photos of wildlife crossings that work — or not, go to westword.com. Contact the author at alan.prendergast@westword.com.**