Title
Innovative partnerships that address highway impacts to wildlife habitat connectivity in the Northern Rockies

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INNOVATIVE PARTNERSHIPS THAT ADDRESS HIGHWAY IMPACTS TO WILDLIFE HABITAT CONNECTIVITY IN THE NORTHERN ROCKIES

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Abstract; The U.S. Northern Rocky Mountains are comprised of three large and sparsely populated states. They are also exceedingly highway-oriented places, with one of the highest rates of rural travel in the country. High volumes of traffic along transportation corridors can block, deflect, or delay daily, seasonal and lifetime wildlife movements. Highways and the vehicles that travel upon them are resulting in habitat fragmentation, habitat loss and direct mortality to the region's signature species, such as the grizzly bear, elk and lynx. American Wildlands' *Corridors of Life* program has used scientifically defensible methodologies to identify over 100 wildlife migration corridors with the highest potential to serve as conduits of wildlife movement between the U.S. Northern Rockies' core protected areas. U.S. Interstates or state highways bisect the majority of these potential wildlife corridors.

In order to address the impacts that highways have upon habitat connectivity in the Northern Rockies, American Wildlands has organized an innovative multi-disciplinary working group to improve wildlife movement and human safety in a potential wildlife corridor in Montana. This working group has representatives from federal, state and county agencies as well as land trusts, independent biologists, conservation groups, and university researchers. The Bozeman Pass Working Group is focusing on a 30-mile stretch of I-90 in western Montana that serves as one of the only corridors between the Greater Yellowstone and the Northern Continental Divide ecosystems. The goal of the Bozeman Pass Working Group is to address factors that limit wildlife movement across the landscape, improve highway safety, protect key parcels of private land and ensure public lands are managed in a way that promotes habitat connectivity. The members of the Bozeman Pass Working Group have developed scientific studies, using GIS and field biology tools with the objectives of identifying the highway's impacts on wildlife. The findings from these scientific studies have been incorporated into private and public lands conservation efforts and highway mitigation initiatives. The Bozeman Pass Working Group has successfully secured funding for mitigation projects that will improve wildlife movement and human safety along I-90.

Problem Statement

The U.S. Northern Rockies, which includes western Montana, central and northern Idaho, and northwestern Wyoming, has three fairly intact ecosystems: the Northern Continental Divide, the Salmon-Selway and the Greater Yellowstone. These ecosystems have generally maintained their wild character, charismatic mega-fauna and ecosystem function. Due to these fairly intact ecosystems, the U.S. Northern Rockies is still home to most of the native species that existed when Lewis and Clark arrived, such as wolf, bison, lynx, wolverine, fisher, marten, goshawk, eagle, grizzly and black bear and mountain lions. It is believed that "the best opportunity for management of a functional carnivore community in North America is the Northern Rocky Mountains of the United States and the Southern Rocky Mountains of Canada. It may be the last place in the lower 48 states where this opportunity exists" (Ruediger 1999).

With increasing human development, wildlife habitat in the region is becoming extremely fragmented. Habitat loss and fragmentation at a variety of spatial scales has been widely acknowledged as a primary cause of the decline of numerous species throughout the world (Ehrlich 1986). Fragmentation from human development, roads, off-road vehicle development and other activities is rapidly shrinking, dividing, and isolating the ecosystems of critical habitat in the Northern Rockies. Projections are for this trend of habitat fragmentation to continue and accelerate, as the Northern Rockies is one of the fastest growing regions in the U.S. (Quigley et al. 1996). Human built structures, such as roads, eliminate connectivity as well as decrease habitat quality and are extremely destructive to small populations that are already threatened (McKelvey et al. 2002). Roads are one of the leading causes of habitat destruction and loss of connectivity throughout the world. One result of the regional scale fragmentation in the Northern Rockies is particularly evident with the current situation of the grizzly bear, which is now isolated in a handful of remnant isolated populations. The bear populations are centered in large, relatively undeveloped and undisturbed areas, including the Greater Yellowstone Ecosystem, the Northern Continental Divide Ecosystem and, to a much lesser degree, in the mountains of northern Idaho and northwest Montana (USFWS 1993). Gene flow and movement between core areas of wildlife habitat is essential to decrease their probability for extinction (Soule 1987, Harrison 1994, and Hanski 1999). Without habitat links, these park and wilderness islands will become mere holding pens for the rich native wildlife of the Northern Rockies.

American Wildlands (AWL) *Corridors of Life* Program has used Geographic Information systems (GIS) to identify the least-cost path for wildlife movement between the northern Rockies core areas (Walker and Craighead 1997). The *Corridors of Life* model has identified over 100 potential wildlife migration corridors throughout the Northern Rockies. Almost every major potential wildlife corridor identified by AWL is bisected by four-lane interstates, two-lane highways or other major roads. These highways traverse a variety of landscapes and human communities and rich wildlife habitat, and have taken their toll on wildlife populations in the Northern

Rockies. High volumes of traffic along transportation corridors block, deflect, or delay daily, seasonal and lifetime wildlife movements. Species most vulnerable to habitat fragmentation caused by roads are those with large home ranges and low population numbers, including large mammals and, in particular, carnivores (Haas 2000). Some examples of species directly affected by roads are grizzly bears, black bears, gray wolves, mountain lions, lynx. The effects of roads are so detrimental to connectivity, in fact, that studies have shown that gray wolves that migrated from Canada to reestablish in Montana stopped when they reached Interstate-90. Specifically, Defenders of Wildlife gives the following impacts of roads on wildlife:

1. Mortality from road construction
2. Mortality from collisions with vehicles
3. Modification of animal behavior
4. Alteration of the physical environment (including soil, temperature, light, etc.)
5. Alteration of the chemical environment (including metals, salts, nutrients, etc.)
6. Spread of exotics
7. Increased use of areas by humans

In addition, it is widely known that highways and roads have far-reaching effects outside of the highway corridor, leading to avoidance of roads and adjacent habitat, and degradation of habitat quality. An estimated 15-20 percent of the United States is ecologically impacted by roads (Foreman 1998). In the U.S. alone, 4.8 million hectares of land have been directly destroyed by road construction (Trombulak and Frissell 1999). This is land that used to support flora and fauna that are now experiencing the effects of habitat fragmentation and unnatural threats such as roadkill (Trombulak and Frissell 1999). In fact, in order to determine the actual amount of suitable habitat for wildlife, one must superimpose a map of the road system in the U.S. on the areas that seem to be suitable habitat; almost always, habitat boundaries are dictated by road locations (Devlin 1998). Along with road construction and vehicle traffic comes an increase in development and resource extraction in areas that were formerly undisturbed habitat (Cerulean 2002). Thus, it is not surprising that, according to Bill Ruediger, U.S. Forest Service's ecology program leader for highways "[the impact of highways on wildlife] is the conservation issue of the 21st century" (Devlin 1998).

It is estimated that one million vertebrates are killed every day on roads in the United States (Lowy 2001). In the Northern Rockies, the amount of wildlife killed in wildlife-vehicle collisions has not been calculated, but one study may be an indication of the extent of mortality. In a 30-mile wildlife corridor in Montana, 127 ungulates and carnivores were killed during the year 2001 by vehicles along I-90 (Craighead et al. 2001). Wildlife-vehicle collisions also have a great potential of causing injury or death to humans and property damage to vehicles. Montana Department of Transportation's annual traffic and safety report for the year 2002 found that there were 1,796 reported wildlife-vehicle collisions and three of these were fatal, and in 2001 there were 1,643 wildlife-vehicle collisions and three were fatal. Two-hundred people are killed and 29,000 are injured in the United States each year in deer-vehicle collisions alone (Conover et al. 1995). Western Transportation Institute estimates that annually in the United States there are 725,000-1,500,000 animal-vehicle crashes that cost society $1 billion in property damage (WTI 2003). In 2000, the insurance industry estimated the average vehicle repair expense for a collision with a large animal was $2,000, thus contributing to an annual animal/vehicle societal expense of $200 million (U.S. Dept. of Transportation 2000). In some states in the U.S., 6 to 8 cents of every insurance dollar goes toward paying for wildlife-related claims (Lowy 2001). Nationwide, in 2001 vehicle-wildlife collisions were responsible for an estimated 29,000 human injuries and 177 human fatalities (Forman 2003, STPP 2001).

Since road construction is not showing any signs of slowing and vehicular travel is only becoming a more integral part of the American culture, it is crucial that solutions are found to decrease the impacts that wildlife-vehicle collisions are having on wildlife populations and human safety. American Wildlands and our partners have been pursuing an innovate approach to reduce wildlife-vehicle collisions and increase wildlife movement over one busy section of Interstate 90 in Montana.

Methodology

In 1996, American Wildlands realized that there was a growing awareness of the need for habitat connectivity, and created a scientifically based model to identify the location of the wildlife migration corridors in the Northern Rockies. In order to advance scientific modeling methods for habitat connectivity analysis, the *Corridors of Life* Program at American Wildlands was developed to assess and delineate wildlife corridors according to a conservation biology model, at a regional scale, in a specific geographic area. Using GIS, the best available spatial habitat data and careful consideration for the habitat preferences of three select umbrella species, we have modeled potential regional-scale wildlife corridors between core protected areas in the Northern Rockies region of the United States. AWL's approach offers a comprehensive, biologically defensible assessment of probable corridor routes, and suggests a method, the least-cost-path, of estimating the relative connectivity of alternative routes (Walker et. al. 1997)

The least-cost-path model delineates landscape routes offering the best chance of success for wildlife moving among the three large core ecosystems in the Northern Rockies -- the Salmon-Selway, Northern Continental Divide, and Greater Yellowstone Ecosystems. Using ARC/GRID and Montana Gap Analysis data, habitat suitability models were derived for three umbrella species, and combined with road density information to create kilometer-scale cost surfaces of movement. For each of the three species, grizzly bear, elk, and cougar, a least-cost-path analysis to locate broad potential corridor routes was performed. From this first approximation we identified probable movement routes, as well as critical barriers, bottlenecks, and filters where corridor routes intersected with high risk habitat (Walker et. al. 1997). (See figure 1, *Corridors of Life* Regional Model Results)

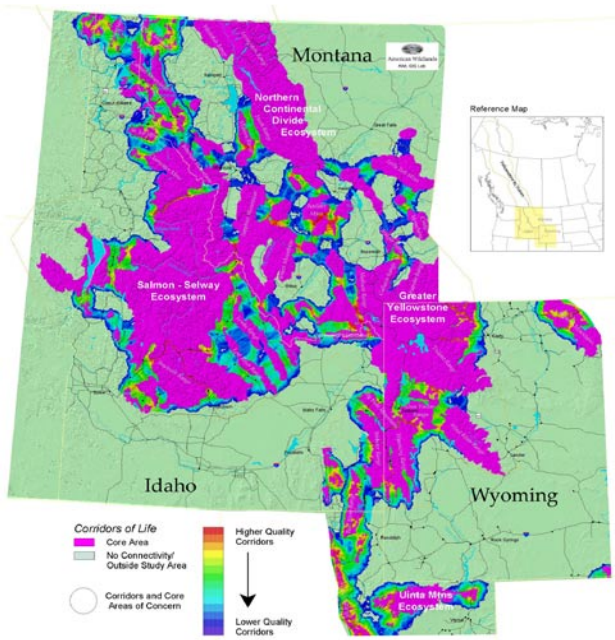

Fig. 1. *Corridors of Life* Model Results.

In order to address the impacts that highways have upon wildlife habitat connectivity in the Northern Rockies, American Wildlands has organized an innovative multi-disciplinary working group to improve wildlife habitat connectivity and highway safety in a priority potential corridors that the *Corridors of Life* model identified. This working group has representatives from federal, state and county agencies as well as land trusts, independent biologists, conservation groups, and university research institutes. The Bozeman Pass Working Group is focused on maintaining and enhancing one of the only wildlife corridors that connects the Greater Yellowstone and the Northern Continental Divide Ecosystems. Three other working groups have been organized for (1) McArthur Lake Wildlife Corridor, an 11-mile stretch of Highway 95 in northern Idaho that serves as the only remaining wildlife corridor between the Selkirk and Cabinet-Yaak ecosystems, (2) Monida Pass, a key corridor connecting the Greater Yellowstone and Salmon Selway Ecosystems, and (3) the I-90/Fish Creek west of Missoula, MT, a series of corridors linking the Salmon Selway and the Cabinet Yaak Ecosystems.
Bozeman Pass Wildlife Corridor lies in between the towns of Bozeman and Livingston in southwestern Montana, and is 40 miles north of Yellowstone National Park (figure 1). Bozeman Pass Wildlife Corridor encompasses approximately 908km^2 /223,917 acres and includes the cities of Bozeman on the western edge and Livingston on the eastern edge. Interstate 90 bisects the area between Bozeman to Livingston, and the Montana Rail Link runs parallel to the freeway. The distance between Bozeman and Livingston is approximately 33.6km (21 miles). The area comprises a mosaic of residential, agricultural and public lands owned by the U.S. Forest Service and Montana State Department of Lands. The landscape varies from shrub-grassland communities near Bozeman and Livingston to coniferous forests in the middle section of Bozeman Pass. Elevation varies from 1,398 meters at its low point near Livingston to 1,733 meters at the top of the pass. Wildlife habitat is fragmented by human development and transportation routes between the Gallatin and Absaroka mountain ranges in the south to the Bridger and Bangtail Mountains in the north. The *Corridors of Life* model and others have identified Bozeman Pass as an important wildlife corridor or linkage connecting important wildlife habitat between the Greater Yellowstone Ecosystem and the Northern Continental Divide

(Walker and Craighead 1997, Ruediger et. al. 1999). Species that are common in the area include moose, elk, black bear, coyote, mule and white-tailed deer, and the occasional wolf.

Wildlife migrations and habitat connectivity compete with residential and commercial development, Interstate 90 and frontage roads, and the Montana Rail Link train track. I-90 runs through the middle of this wildlife corridor with traffic volumes having increased from an average annual daily rate of 1,620 vehicles in 1983 to 8,700 in 1993, to 12,130 vehicles in 2002 (MDOT 2003). The Montana Rail Link train track has an estimated 25 trains a day rolling through the Pass. The lands owned by the Gallatin National Forest have remnant logging roads on them, and ever-increasing motorized recreation use. The bulk of land, privately owned has been subdivided in a rural manner, with many of the large sections of private land remaining threatened by subdivisions. A total of 18,000 acres of the Pass were recently leased by J.M. Huber company for coal-bed methane, a highly intense oil and gas development process.

Realizing there exists a limited window of opportunity to protect, maintain and restore wildlife habitat connectivity in Bozeman Pass, American Wildlands decided to devote time and energy to maintain and restore the habitat connectivity of the area. We started by approaching Montana Department of Transportation about partnering to address the highway component of this corridor. They were not interested in such a partnership at that time, since we had not demonstrated broad-based public and agency support for addressing wildlife movement in this area, and we had failed to show that there were scientific data to back up the fact that wildlife were being limited from moving north to south due to Interstate 90. We reevaluated our approach and took the following steps.

Step One: Building Public Support

American Wildlands determined that the best way to build public and agency support was to develop a constituency of public, NGOs and agencies that would work together to address wildlife movement in Bozeman Pass. We determined that this could best be done by organizing a working group. To develop the working group, we looked at the three main factors that were limiting habitat connectivity at Bozeman Pass: public and private lands, and I-90. It was apparent that the only way to make change was to bring everyone related to these issues to the table to determine if any common ground existed among the various parties. What resulted was a diverse group of parties including American Wildlands, Western Transportation Institute at Montana State University, Craighead Environmental Research Institute, Montana Department of Transportation, Gallatin Valley Land Trust, Trust for Public Lands, Montana Fish, Wildlife and Parks, U.S. Forest Service, Greater Yellowstone Coalition, Gallatin County Planning Office.

American Wildlands has acted as the facilitator and organizer of this working group. The initial steps taken by the Bozeman Pass Working Group included the following items.

1) Group members identified the work they were doing in Bozeman Pass.
2) Group members established common goals and mission statement.
    -Identify wildlife crossing areas and incorporate appropriate mitigations into I-90.
    -Increase human safety on this 30-mile stretch of I-90 by decreasing wildlife-vehicle collisions.
    -Protect wildlife habitat on both private and public lands. Restore wildlife movement from the Gallatin to Bridger Bangtail Mountain Ranges.
3) Group members established action steps.
    -Create a scientific study to determine I-90's impacts to wildlife.
    -Identify opportunities for habitat protection on private and public lands.
    -Explore highway mitigation opportunities.

Step Two: Scientific Study- GIS and Field Biology

The majority of the scientific study was conducted by the Craighead Environmental Research Institute (CERI), with support from American Wildlands (AWL) and Western Transportation Institute (WTI). The objectives of the study were to (1) develop geographic information systems (GIS) and file biology tools that could accurately predict where wildlife are crossing highways (in this case I-90), (2) determine priority areas for wildlife habitat protection, (3) determine appropriate sites for potential underpasses, overpasses, fencing and other mitigation for wildlife movement across the highway, 4) provide input for highway construction and planning.

AWL and CERI cooperatively developed a least-cost-path, landscape-level GIS model to determine areas of highway quality movement habitat in the wildlife corridor. (For full details of the model see *Proceedings from 2001 ICOET* - Craighead et. al). Modeling methods were based upon the American Wildlands *Corridor of Life* Model discussed earlier in this paper (Walker 1997), though it had a building density variable added. Four variables were used: habitat suitability, habitat complexity, weighted road density, and building density. Unlike the original regional scale model, the Bozeman Pass analysis was completed to achieve a landscape level view of wildlife movement. The cell size used for analysis, therefore, was smaller than the regional model, 30 x 30 meters instead of 1 x 1 kilometers. All spatial analysis, was done in Environmental Systems Research Institute's (ESRI) ArcInfo™ software. The model was designed to assess the movement potential of wildlife through the Bozeman Pass. Wildlife species were split into two groups: forest carnivores and ungulate species. The forest carnivore group included black bear, grizzly bear, mountain lion and wolf species. Ungulate species group included moose, elk, mule deer and whitetail deer. The differences between the forest carnivore model and the ungulate model were due primarily to differences in habitat values assigned to each group, and secondarily to using an additive rather than multiplicative algorithm (Craighead et. al. 2001). Results of the landscape-level model are displayed in figures 2 and 3.

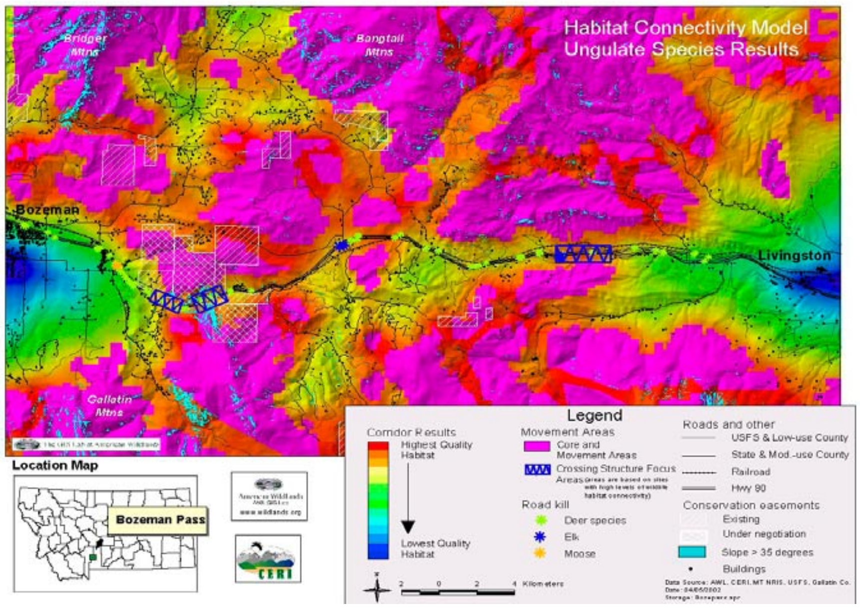

Fig. 2. Bozeman Pass ungulate results.

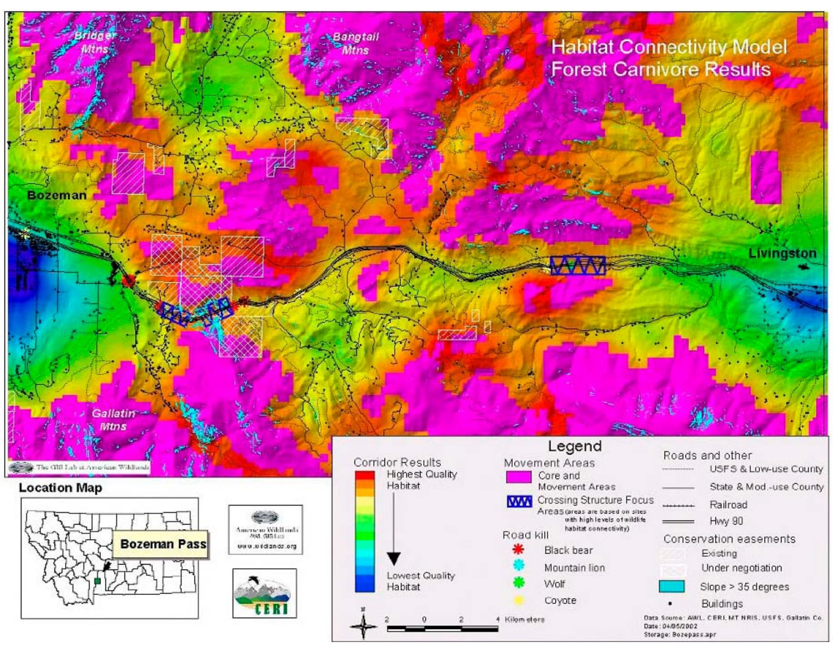

Fig. 3. Bozeman Pass forest carnivore results.

The Craighead Environmental Research Institute (CERI) took the lead on developing the field biology study for which the objective was to determine as accurately as possible the routes that animals use as they attempt to traverse the highway at Bozeman Pass. This study is briefly summarized here. Details on this study can be found in the ICOET proceedings for 2001 (see Craighead et al. 2001). In addition, biological data were used for ground-truthing the GIS model results. There were three field methods used in this study: road-kill collection, remote cameras and track surveys.

Road-kill Collection and Results: From January 2001 to summer 2002, biologists at CERI and volunteers drove along Interstate 90 over Bozeman Pass between Bozeman and Livingston and recorded the date, location to the closest milepost in tenths of a mile, and species of road-kills observed. Sex was recorded for carnivores, if possible. Volunteers typically traveled Bozeman Pass during weekdays and CERI personnel drove the pass during the weekends. Unusual road-kills (those other than raccoon, mule and whitetail deer) were further investigated by CERI personnel. In addition, searches of agency records were conducted to provide additional vehicle-wildlife collision data, such as road-kill data from Montana Department of Transportation and Montana Fish Wildlife and Parks.

Results of the road-kill collection resulted in 184 individual ungulate kills reported between 2001 and 2002. A wide variety of species were killed along I-90, including black bear, mountain lion, wolf, coyote, red fox (*Vulpes vulpes*) and American marten. Ungulate species killed included mule deer, whitetail deer, and elk, and moose. Seventy-one percent of all forest carnivore kills were along a five-mile section near Bear Canyon and 41 percent of ungulates and 45 percent of all species identified were found within the same section.

Track surveys and results: During the winters of 2001- 2003, tracking surveys were implemented to determine where animals were crossing I-90. Locations for track surveys were based on the two locations where existing roadway crossing structures already existed. The goal of the track surveys was to determine if wildlife were using the underpasses or moving up to cross I-90. Several ungulate crossing areas were determined from track surveys. No carnivore tracks were observed to cross the highway. Successful crossing areas corresponded with areas of road-kill locations. Tracks which crossed the highway were located using GPS, and other track behavior, such as approaches to the highway, or movement parallel to the highway was recorded. Species were identified, when possible. All data points were entered into a GIS database.

Remote camera and results: Remote cameras were posted in the summer of 2001 within three culverts, chosen based upon the existence of a culvert at each location. Data from the cameras were used to identify use of these structures by wildlife in the study area. If useful to wildlife movement, enhancement of these culverts could be an easy first step for wildlife mitigation efforts. Data from these cameras were collected through the summer of 2002. Several species were recorded using culverts to traverse the Interstate. These include raccoons, rabbits, marmots, mink, weasel, mule deer and black bear.

Step 3: Taking Science and Applying it on the Ground

Once the GIS models and field biology data were collected, the working group was ready to use this information to pinpoint the most important areas for restoring and maintaining habitat connectivity. Specifically, the model results and biological data, coupled with local knowledge, were used to identify places that wildlife were trying to cross I-90 and identify the key public and private lands to work to conserve. This information has been used to guide the work to increase wildlife movement across Interstate 90 in a number of ways. The Bozeman Pass Working Group first assessed the transportation mitigation opportunities to identify if there is an overlap between the wildlife crossing locations and planned highway construction projects or existing crossing structures that could be retrofitted to better allow for wildlife movement. The working group was fortunate that there was a resurfacing and bridge replacement project proposed for the area results (Bear Canyon) that had been found in field biology work to have the highest number of road-kill/track and camera. The working group developed a mitigation project to take advantage of a planned construction project to re-build a highway bridge over a railroad track at Bear Canyon. If there had been no planned projects or existing structures to tie into, as is the case for many highways, new dedicated wildlife crossing structures or other mitigation would have to be considered for the key wildlife crossing location. Montana Department of Transportation agreed to install fencing and moose guards so the wildlife could be re-directed underneath Interstate 90 through the existing bridges and culverts at Bear Canyon. The fencing project will be constructed in 2005. Once the fencing project had been committed to, funds for the project had to be secured. At Bozeman Pass this was done through private foundations, Montana Department of Transportation (who is covering the fencing component and some wildlife monitoring), and through congressional appropriations. Certain members of the working group have been involved in developing the engineering, design and construction plans for the project (Western Transportation Institute and Craighead Environmental have been mainly involved). In addition, monitoring plans have to be created for pre and post construction to determine the fencing project's effectiveness.

Monitoring before and after mitigation efforts is vital to identify whether mitigation measures are successful. These data will help support future proposals and in communicating the value and importance of such projects to the public and decision makers.

Another project that the working group has developed to decrease wildlife-vehicle collisions and hopefully increase habitat connectivity is the Bozeman Pass Wildlife Channelization ITS project. Montana Department of Transportation was granted funding, through the 2003 Omnibus Appropriations bill, to use Intelligent Transportation Systems (ITS) to address wildlife-vehicle conflicts and habitat connectivity on Bozeman Pass (ITS Deployment Program Project ID Number VIL.H.24, entitled Bozeman Pass Wildlife Channelization ITS Project). This project, managed by Western Transportation Institute (one of the working group members) focuses on using ITS, in conjunction with wildlife fencing, to reduce wildlife collisions and maintain and improve wildlife movements and also uses wildlife monitoring to determine the effectiveness of the ITS work. The project, which started in the fall of 2003, will use changeable message signs and highway advisory radio to inform Bozeman Pass motorists about wildlife movements and wildlife-vehicle conflicts. WTI will assess the effectiveness of using these two ITS applications as mitigation measures to increase public awareness, reduce driver speeds and reduce wildlife-vehicle collisions.

In terms of private lands conservation, the working group has used a variety of private land conservation efforts to protect wildlife habitat in the Pass. The working group members identified wildlife habitat that should be the top priority of private lands conservation efforts in Bozeman Pass based on the landscape-level model and field data. The working group has used these results to develop a number of habitat protection measures. The land trusts involved in the working group have successfully secured conservation easements adjacent to and near Bear Canyon (where fencing project is located) on over 2,000 acres and are in the process of finalizing more. These conservation easements have helped reassure to the Montana Department of Transportation that the funds devoted to the fencing project are being used on wildlife habitat that is going to stay intact. Another initiative that the working group has been involved in is a citizen initiated zoning district for 20,000 acres in the Bozeman Pass corridor. The working group also helped to support the efforts to fight the development of coal-bed methane that was proposed for 18,000 acres of the Pass. Finally, the working group has been actively working with Gallatin County planning staff and developers to limit the impacts that new subdivisions have on wildlife habitat in the Pass. All of these efforts have been successful due to the field biology and model's validation of the need to protect this area for wildlife habitat and connectivity.

In terms of increasing habitat connectivity on the Gallatin National Forest, the working group has primarily been focused on the Gallatin National Forest Travel Plan Revision process. Using the landscape-level model and field data, the working group was able to focus on a few particular areas to determine the impacts travel management was having on habitat connectivity. One of these areas is the Bear Canyon area, south of the highway fencing project, which has significant motorized recreation and fairly high road density that is impacting wildlife movement. The Gallatin National Forest has developed an action alternative (#6) that specifically addresses the connectivity issues in Bozeman Pass.

Discussion and Conclusions

The Bozeman Pass Working Group is a unique approach to the conservation of wildlife habitat and habitat connectivity that may be applied to other areas. This working group has been successful for a number of reasons, but primarily due to the approach of involving all applicable parties and focusing on common goals. The working group's work was significantly strengthened by the ability to develop a scientific study to identify key parcels of land to protect and sections of Interstate 90 on which to focus mitigation efforts. Another wise approach of the working group is the tying together of all of the initiatives. In order to secure a future for wildlife to move across the Bozeman Pass wildlife corridor, the approach had to be holistic and look at the area and all the various factors that were limiting wildlife movement, and systematically address all of them. An example of this was the manner in which private and public land conservation efforts focused on the section of I-90 where mitigation measures were to take place. This resulted in a pathway of private and public conservation north and south of the highway. The Bozeman Pass Working Group had two main advantages on their side — a very supportive community (including individuals and county government) and the threat of 18,000 acres of coal-bed methane wells, which mobilized and unified the community and educated them on the importance of this area for wildlife. Finally, the success of the working group is also attributed to the fact that the individuals involved have tackled work that pertains to their specialty, rather than every member of the group dealing with every issue. All conservation efforts have their associated challenges, and this one is no exception. The most notable challenge was the time commitment required for members to participate and the need for clear leadership and facilitation. Probably the most challenging issue for this group, initially, was the need for individuals and groups, who are not normally allies, to sit down at a table together and work towards a common goal.

The Bozeman Pass Working Group principles have been duplicated at McArthur Lake, and are just beginning to be implemented in three other areas: Fish Creek area, Monida Pass and Raynolds Pass. This model of collaboration could successfully be applied to other key wildlife migration corridors throughout the country as a way to reduce wildlife-vehicle collisions and maintain habitat connectivity. Implications for future research and policy development include state departments of transportation incorporating wildlife connectivity needs into their statewide planning. In addition the Transportation Equity Act of the 21st Century could include more funding for projects of this type.

Biographical Sketch: Deb Kmon Davidson is the lands program coordinator for American Wildlands. Her education includes a B.S. from St. Lawrence University and an M.S. from the University of Montana. For five years Deb was an environmental educator throughout New England and Montana. She served two internships as a research intern in Kenya and at the Alliance for the Wild Rockies as a Forest Watch advocate. Before joining American Wildlands almost four years ago, Deb worked for The Ecology Center and Wilderness Watch, both in Missoula, MT. She worked on public lands policy and issues for both organizations. Her master's thesis detailed problems with federal land exchange policy and its impacts on local ecosystems in the N. Rockies.

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