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Wildlife Connectivity Across Utah's Highways

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WILDLIFE CONNECTIVITY ACROSS UTAH'S HIGHWAYS

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Abstract: The Utah Department of Transportation sponsored a workshop to identify major sections of Utah's highways that disrupt wildlife connectivity. This workshop was attended by representatives from the Utah Department of Transportation (UDOT), Utah Division of Wildlife Resources (UDWR), U.S. Forest Service, U.S. Fish and Wildlife Service, and several private consulting and conservation groups.

During the workshop, and subsequently in some of the UDWR offices, 64 separate connectivity zones were identified. These were prioritized based on professional opinions and experience of biologists who were familiar with the linkage areas. From this, it was estimated that 222 miles of Utah's roads and freeways cross through critically important connectivity zones, 287 miles of roads cross through highly important zones, and 754 miles cross through moderate priority areas.

Examples of regional connectivity maps and tabulated descriptions are in the Appendix.

Introduction

The Utah Department of Transportation administers nearly 5,846 miles of highway and freeways, 82% of which run through rural areas. Increasing population and economic growth have contributed to higher traffic volumes in rural areas as well as in urban areas. This, in turn, has led to increasing wildlife-related safety problems. Affected wildlife species may be as small as fish, mice, prairie dogs, rabbits, tortoises, etc., or as large as coyotes, deer, elk, and moose. According to Marshik, et. al. (2001), "In the United States, an estimated one million vertebrates-amphibians, reptiles, birds, and mammals are killed on roads and highways each day."

When wildlife habitat is bisected by highways, animals still have a need to cross the barrier to access their native habitat. Often, due to roadway width, traffic volumes, or other constraints, they are unable, or unsuccessful. This causes what is known as "habitat fragmentation." Habitat fragmentation, and the creation of "fracture zones," can be viewed as a loss of "habitat connectivity." This loss in connectivity is one of the major transportation-related issues DOTs need to address. Wilcox and Murphy (1985) stated, "Habitat fragmentation is the most serious threats to biological diversity...." According to Gore, et al. (2001), "Wildlife habitat connectivity is affected by many human activities, including highway development, private and public land management practices, open space policies, subdivision policies, road access and densities, and many other factors."

Animals crossing roads as they attempt to connect with their natural habitat often pose a safety hazard to motorists. Many species can become trapped on highways by barriers or headlights. Other species either fear to cross these barriers, or are physically incapable of doing so, such as desert tortoises, amphibians, reptiles, rodents and other small mammals, etc. Thus, there is a need for some mechanism to assist these species in crossing.

According to Ruediger (2001), "The primary objective of wildlife and fish crossings is to maintain habitat and population connectivity. For many species, this may require maintaining or simulating the natural functions of their habitat within or on top of traffic crossing structures. Many crossings are designed to facilitate movement of a single or small number of species. Structures would be more functional if connectivity of habitat across highways were given more consideration. More species would be provided for, especially plants, invertebrates, and small animals, if habitat connectivity were at least as important as providing crossings for a few target species. Connectivity of habitat and populations is an ecosystem approach."

Study Objectives

Methods

Following a methodology suggested by Bill Ruediger (then with the U.S. Forest Service in Montana), the Utah Department of Transportation sponsored a workshop to identify major sections of Utah's highways that serve to disrupt wildlife connectivity. This workshop was attended by representatives from the Utah Department of Transportation, Utah Division of Wildlife Resources, U.S. Forest Service, U.S. Fish and Wildlife Service, and several private consulting and conservation groups.

The objectives of this workshop included:

1. Identify where wildlife linkage areas cross Utah's road system.
2. Identify species involved in these linkage areas.
3. Suggest possible solutions to fragmentation.

For this meeting, large (44" x 48") maps of Utah's highway and freeway system were made available for marking of connectivity zones across Utah's highways and freeways. Data sheets were made available for note taking and identification of the problems exhibited in the connectivity zones. Participants were separated into six groups, based roughly on UDOT's six regions and districts.

In this analysis, several key questions were asked on the data sheets:

- Linkage Name
- UDOT Region/District
- Highway or Route Number
- Mileposts
- Conservation Issues Involved
- Species of Concern in each linkage area
- Comments and/or recommendation

Priorities were then assigned to each connectivity zone based on the participants' knowledge of the locales, ecosystems, resident species, habitats, etc. Priorities were designated as critical, high, or moderate. The resulting data and information were then compiled and digitized into a GIS mapping format as shown on figure 1 below.

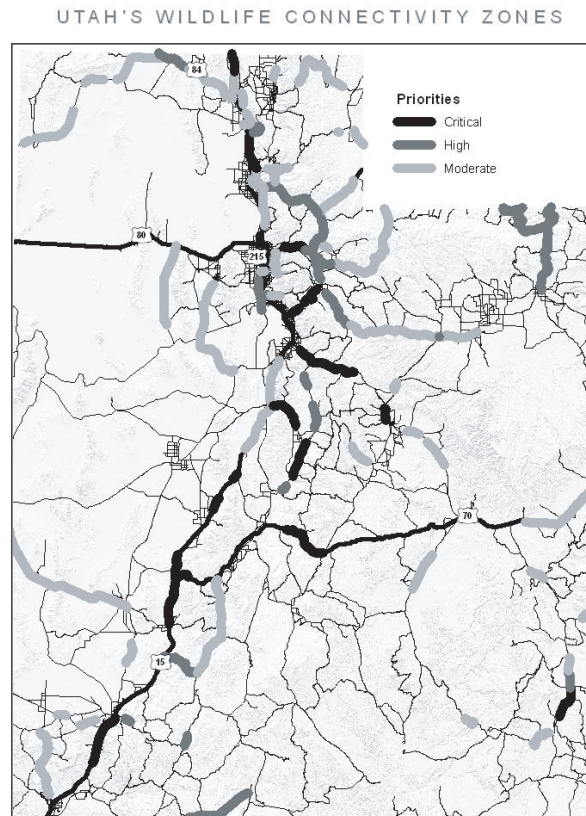


Figure 1. Utah's wildlife connectivity zones

Discussion of Suggested Practices

During the workshop, and subsequently in some of the UDWR offices, 64 separate connectivity zones were identified. These were prioritized based on professional opinions and experience of biologists who were familiar with the linkage areas. From this, it was estimated that 222 miles of Utah's roads and freeways cross through critically important connectivity zones, 287 miles of roads cross through highly important zones, and 754 miles cross through moderate priority areas.

Each of these connectivity zones was described in detail in the Appendix of the final report (examples of which are given at the end of this report).

The suggested mitigating practices generally fall into a few categories: fencing, wildlife crossings, and signing (including infrared sensors), being the most common suggestions given. Below is an explanation of the recommendations that were given.

- By far, most of the suggestion practices to protect wildlife involved maintaining and/or installing wildlife exclusionary fencing with earthen escape ramps.
- Closely associated with fencing is the need for overpasses or underpasses to facilitate wildlife crossing of highways. These are especially important in critical and high priority connectivity zones where animals need to migrate across highways and freeways to attain their native habitat. To be effective, such structures require fencing with escape ramps to funnel wildlife into these structures.
- Many of the workshop participants suggested using some kind of signs to warn motorists of wildlife in the right-of-way. A common comment is that the public can become used to seeing signs, so to be effective, they need to be large and eye catching, possibly with flashing lights, and preferably used only seasonally when animals are migrating through the area in the fall and spring. Some new sign innovations include infrared sensors. When animals wander onto the right-of-way, these sensors would detect their movements and trigger flashing lights on warning signs. Another variation is to place video cameras along critical stretches of highway that would take video photographs of the animals and relay these to a screen that motorists can view as they drive past the monitor. This would help motorists realize that these warning signs are serving a real purpose.
- Reduction of speed limits may help in some instances as well. Where sight distance is limited by poor geometry, or heavy vegetation against the right-of-way, reduced speed limits can help if motorists avoid collisions.
- Roadside vegetation management, especially when coupled with water development, can also have a positive effect on wildlife mortality. Keeping the right-of-way mowed and cleared of brush helps motorists to see animals that may be ready to jump in front of them. Often, the reason wildlife cross highways may be to access water. Development of water facilities, such as guzzlers, may help to reduce this need.

Results and Conclusion

Based on the professional knowledge and experience of the participants at the workshop, it was determined that 222 miles of Utah's highways cross through critically important wildlife connectivity zones. Additionally, 287 miles cross through highly important priority areas, and 754 miles cross through moderately important priority areas. For each of these priority areas, the participants provided important details concerning each connectivity zone, plus suggestions on how to improve connectivity for various wildlife species.

In the Appendix is a map of the one of the UDOT regions (Region 1) to illustrate where some of Utah's connectivity zones occur. Following the map is the table for the connectivity zones in that region. This table contains specific details of the problems for each wildlife connectivity zone, and suggested solutions and recommendations.

During the workshop, it became apparent that biologists alone cannot solve the problems created by highways with regard to the movements of wildlife. Emphasis must be placed on encouraging DOT planners and engineers to incorporate wildlife mitigation measures into new roadway designs, including exclusionary fencing with escape ramps, crossing structures, signage, etc. Highways should not become a barrier to wildlife movement.

Biographical Sketch: Paul West earned his Bachelors of Science degree in Range Science from Brigham Young University, with a minor in wildlife biology. He has done graduate studies in Urban Planning at the University of Utah. Mr. West has nearly 31 years of experience as an environmental professional. He has managed, researched, and written NEPA documents and environmental baseline reports, and managed wetland regulatory projects, including delineating nearly 100,000 acres of wetlands in most of the western United States. He has designed and managed mining reclamation efforts, made erosion and sediment control recommendations, conducted order II soils surveys, performed wildlife surveys, including threatened and endangered species surveys, and riparian and vegetation inventories. Currently he is serving as the Wildlife Program Manager for the Utah Department of Transportation where he insures that UDOT's projects conform to the provisions of the Endangered Species Act, and consider wildlife issues in the planning stage.

References

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Appendix 1 - UDOT Region 1 Wildlife Connectivity

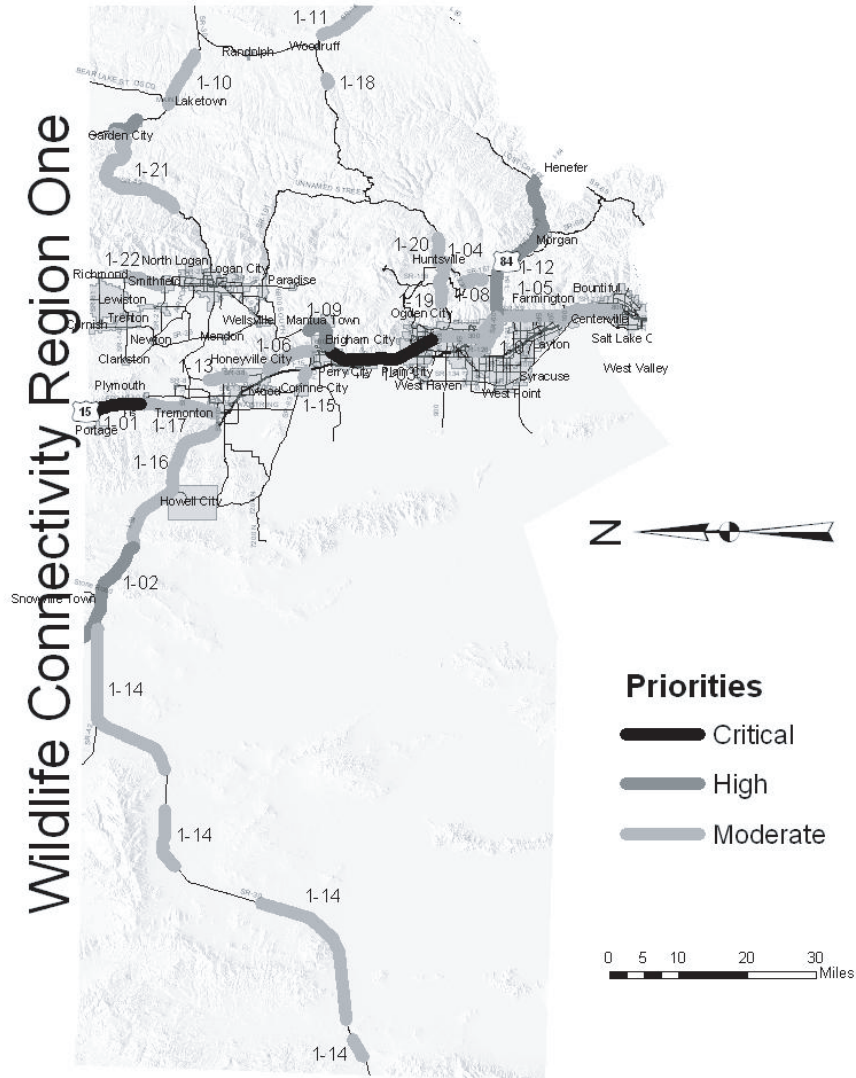


Table 1: UDOT, Region 1 Wildlife Connectivity Zones

Priority	Linkage Area	Name	Route	Reference Posts	Conservation Issue	Species of Concern	Comments	Recommendations
Critical	1-01	Plymouth Area	I-15	392 to 401	*Big Game *Highway Safety *Connectivity to Public Lands	Deer	Mostly private land along I-15, but high deer kill. Mostly grain fields.	Need deer-proof fencing with escape ramps and some kind of crossing structure every mile or so
High	1-02	Snowville Area	I-84	0 to 16	*Big Game *Highway Safety *State Sensitive Species *Connectivity to Public Lands Highway safety	Badger Deer Sage Grouse Raptors	Migratory corridor for deer. Badger and sage grouse habitat on both sides of highway. Public lands on both sides of highway	Need to fence both sides of freeway with escape ramps and some kind of crossing structure every mile or so.
Critical	1-03	Brigham City South	U.S. 89	417 to 434	*Big Game *Highway Safety	Deer	Nuisance deer herd, road safety	Need deer-proof fencing with escape ramps
Moderate	1-04	Highway 39	SR-39	12 to 19	*Big Game *Highway Safety	Deer	None offered	Seasonal warning signs might help.
Moderate	1-05	Highway 89	U.S. 89 I-15	388 to 416 318 to 326	*Big Game *Highway Safety	Deer	Deer killed while crossing highway. Some are urban resident deer while some are migrating down from mountains to winter near the river. Problem area with houses, road, RR crossings, etc. Jersey barriers also appear to a problem by trapping raccoons crossing.	Modify barriers.
Moderate	1-06	Honeyville to Dewyville	SR-38	0 to 7	*Big Game *Highway Safety	Deer	None offered	Seasonal warning signs might help
Moderate	1-07	Riverdale to South Weber – Uintah Area	I-84	81 to 88	*Big Game *Highway Safety	Deer	Deer are killed crossing the highway - resident deer live below Hill Air Force Base bluff, and	Speed Limits? Infrared Sensors?
							sub-divisions and fields. They seem to cross to the riparian habitats. Concern is more for highway safety issues than connectivity issues – approximately 25 - 40 deer are killed each year.	
Moderate	1-08	Trappers Loop Road	SR-167	4 to 7	*Big Game *Highway Safety	Moose	Morgan County portion of Trappers Loop Road is worse than the Weber County portion. Approximately 15 moose are killed every year in this area. Yearlong residents so no real migration issues. The whole road has problems, but most are killed in the 3 – 4 mile stretch. Situation may get worse as more sub-divisions are developed and animals are forced to move more often to find better habitat.	Infrared sensors that could let drivers know an animal is in the vicinity might help. Suggest seasonal warning signs, and lower speed limits where moose are a problem.
High	1-09	Sardine Canyon	U.S. 91	3 to 9	*Big Game *Highway Safety	Deer	Deer are still accessing busy corridor. Heavy snow causes problems to fence and deer are moving just when snow melts so no time to maintain fence properly. An important navigation corridor	Better fence maintenance Retrofit existing underpasses to encourage deer use Add cattle guards to gates which are constantly left open

Priority	Linkage Area	Name	Route	Reference Posts	Conservation Issue	Species of Concern	Comments	Recommendations
								Replace/remove/return gates near Mantua that don't close behind deer and that allow other deer to access/re-access highway
High	1-10	Garden City	SR-30	109 to 114	*Big Game *Highway Safety	Deer	High traffic area. 15 to 20 deer killed/year. A group of resident deer cross highway on evenings to drink from Bear Lake.	Signs would probably work best.
Moderate	1-11	Outside Evanston	SR-16	0 to 8	*Big Game *Highway Safety	Pronghorn	Antelope are killed due to net wire fencing on both sides of highway.	4-strand barbed wire, smooth bottom strand about 16" above ground.
High	1-12	Mountain Green, to Echo Junction.	I-84	88 to 119	*Big Game *Highway Safety	Deer Elk Fish Songbirds Amphibians Small & Medium Sized wildlife	R.P. 112-120 elk hot spot. R.P. 149-156 deer hot spot. Yearlong mortality, but kill increases during migration. About 300 deer are killed per year in this area during a normal, average snow year. More during heavy winters periods. Round Valley area historically picks up 100 deer per month. The Weber River in	Please give this some serious thoughts – especially with Governor Walker's Waterbody Program! We could at least improve aquatic habitat with cross vanes and log (large woody) structures. Another good idea for a collaborative effort. Could Jersey barriers either be removed or modified with holes underneath that would allow animals to crawl underneath. DWR and UDOT should coordinate efforts to
							Weber Canyon between the freeways. This reach is very impacted, with no floodplain and no riparian area. Although this area may be relatively inaccessible to angling, good habitat should grow larger fish, which could potentially move out of the reach into more fishable areas. Jersey barriers create movement problems to small to medium sized wildlife that get on the highway? Hundreds of animals are killed every year. The Weber River in Several sections especially below Echo Reservoir: The construction of I-84 in the 1960s significantly impacted the Weber River. In several locations, especially near Henefer, the river was straightened resulting in stream degradation in the straightened segments and aggradations and	restore stream meanders and floodplain connectivity near Henefer Since some of the sportsman's dollars are to mitigate the impacts of I-84, it would seem appropriate that UDOT help fund some stream rehab. Great PR opportunity for UDOT, UDWR & sportsmen's groups to collaborate on making the river great again!

Priority	Linkage Area	Name	Route	Reference Posts	Conservation Issue	Species of Concern	Comments	Recommendations
							lateral erosion in downstream reaches. Currently, most stream rehabilitation efforts are being funded by sportsman's dollars. Good floodplain connectivity will also reduce nearby flooding, protect people, home, and highway, and reduce roadbed erosion.	
Moderate	1-13	Deweyville	SR-38	11 to 16	*Big Game *Highway Safety	Deer	Deer migrate from Wellesville to Bear River floodplain/valley floor. Winter problem; road is at the edge of their winter range.	*Slow speed to 45 mph or less (it is a residential area)
Moderate	1-14	Grouse Creek	SR-30	3 to 6 9 to 33 47 to 56 62 to 88	*Big Game *Highway Safety *Connectivity of Public Lands	Pronghorn Deer	Annual migration routes. Fences are being built now where there have not been any fences.	Require fencing with raised (14-16") smooth bottom wires. No net wire! Height should be 42". All new fences must meet above specs. Height is 51" - 54" where they are putting in fences now. *Modify existing fence from 54" to 42"
Moderate	1-15	Corinne	SR-13	6 to 7	*Big Game *Highway Safety	Deer	20 to 30 deer killed per year from 2600 West to Corinne (3800 West). Resident deer travel corridors of the Bear River drainages and slough.	Lights or sensors
Moderate	1-16	Snowville	I-84	16 to 39	*Big Game *Highway Safety *Connectivity of Public Lands	Deer Elk Short-eared Owls	Deer migrate from Idaho into Utah for the winter. 10% of deer population is killed from Nov to March. Deer migrate from Idaho to Utah to winter. Significant Elk winter range north of I-84.	Fencing and Overpasses Large Flashing Signs
Moderate	1-17	Plymouth	I-15	382 to 392	*Big Game *Highway Safety	Deer	10 to 20 deer killed annually between R.P. 384 & 390 - Malad River Corridor. These are mostly resident deer. Some winter migration occurs between R.P. 384 & 390.	Need deer-proof fencing with escape ramps and some kind of crossing structure every mile or so.
Moderate	1-18	East of Woodruff	SR-39	62 to 63	*Big Game *Highway Safety	Deer	15 - 20 killed per year. Deer cross highway in mornings and evenings to feed in adjacent fields. Deer are present during winter and early spring and then migrate to the top of Monte Cristo. Some deer are resident year round. This herd unit is under objective; we don't want to further reduce #'s.	Seasonal, flashing warning signs might help.

Priority	Linkage Area	Name	Route	Reference Posts	Conservation Issue	Species of Concern	Comments	Recommendations
Moderate	1-19	Laketown Canyon	SR-30	119 to 128	Big Game Highway Safety	Deer	Migration route for deer, cross in Laketown Canyon. Winter range is on both sides of canyon (steep) so animals are frequently on the road and are killed. 100+ deer are killed/year (mainly fall/winter kills) Cache deer herd unit. Herd unit is under objective and sportsmen want us to increase herd numbers	We asked UDOT to sign this canyon 1½ - 2 years ago and we were told that signs in this area were not a priority for UDOT. Overpass would make the most sense. Could fence draw to force animals to cross in a different area, but this may more widely disperse animals and cause more problems.
Moderate	1-20	Huntsville	SR-39	20 to 23	*Big Game *Highway Safety	Deer	50 to 75 deer killed each year Deer cross between Monastery & Green Hills Subdivisions. Migrating animals mostly (spring & fall) but some yearlong issues.	A few years ago, UDOT put up flashing signs. This has seemed to help reduce mortality.
Moderate	1-21	Logan Canyon	U.S. 89	474 to 499	*Big Game *Highway Safety	Deer Elk	Tony Grove turnoff area (the large flat) Just west of Garden City (where switchbacks & flat areas are) Deer are resident; elk are more seasonal.	Slow people down! Flashing lights may work.
							Tony Grove area is a summer range area so movements are across the highway. Garden City area is winter range area. Elk feed in raspberry fields, then cross highway	
Moderate	1-22	Smithfield to Richmond	U.S. 91	35 to 39	*Big Game *Highway Safety	Deer Elk	Seasonal migrations for deer & elk (spring & fall). Some deer become resident and become a yearlong problem (dairies & haystacks). Animals are coming from USFS lands and cross to the Bear River floodplain. Depending upon snow amount, could have hundreds killed during a season. These are in the Cache Valley deer herd which is under objective & sportsmen want UDWR to increase herd #'s.	Work on highway is starting now for road widening, so something should be done now. Not sure what the solution is!