Volume 4
Wildlife Field Notes

Arizona State Route 260 Lessons Learned: Wildlife Crossing Design

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Introduction

Wildlife crossing structures (WCS) are becoming increasingly common for minimizing the impacts of highways on wildlife. Given their high cost, it is essential to design them appropriately. WCS consist of a variety of shapes and sizes ranging from small culverts to large overpasses. Understanding the target species that will utilize the WCS is extremely important to a successful design. In some cases there is a solid knowledge foundation, while in others we continue to learn appropriate designs through monitoring of WCS. Along State Route 260 (SR 260) in central Arizona, monitoring of WCS has provided significant insight into their success. Lessons learned from this insight helps inform proper design of future WCS.

Design Considerations for Elk and Deer

Many prey species spend their lives avoiding predators, so it is important to take this into consideration when designing WCS. Two adjacent wildlife underpasses along SR 260 are similar in size and length; however, one uses walls to retain the soil versus natural slopes (Figure 1). Video surveillance of these underpasses showed that elk (*Cervus elaphus*) approaching and entering the underpass with retaining walls were noticeably reluctant to pass through. Elk appeared to focus their attention on the ledges atop the walls. Over four years of post-construction monitoring, the reluctance of elk using the walled underpass diminished. Although the percentage of approaching elk that successfully crossed at the neighboring structures converged over time, the underpass with natural slopes had double the number of total elk crossings.

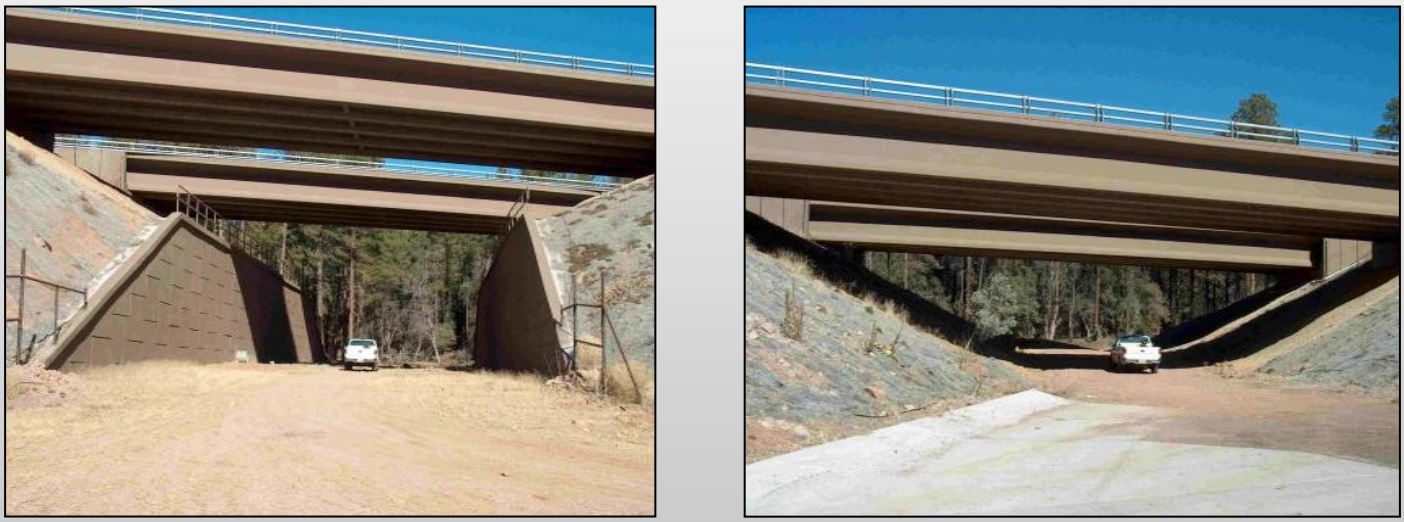

Figure 1. Example of two different wildlife underpass designs; elk appeared reluctant to use the underpass with walls and focused on the associated ledges (left), whereas elk readily used the underpass without walls (right).

Using an adaptive management approach and guided by this information, Arizona Game and Fish Department, Arizona Department of Transportation and Tonto National Forest changed the designs of WCS that were planned for the next phases of construction by redesigning them with natural slopes and adding vegetation for cover (Figure 2).

Figure 2. Example of wildlife underpass that underwent redesign to remove retaining walls and incorporate cover following lessons learned from previously constructed wildlife underpasses.

Another example of predator avoidance instincts by both elk and deer was documented at two underpasses located within a mile of each other. These underpasses are similar in characteristics, although one is offset and does not allow a clear view of the opposite side, indicating a potential trap (Figure 3). Initially, there was a distinctly lower elk and deer crossing success rate for the offset structure than the one with a clear view of the opposite side of the road. Again, over time, the success rates began to converge as the elk and deer appeared to habituate to them.

Recommendations

Design of WCS is important to most mammals, reptiles, amphibians, fish and many birds. Highway planners should consider WCS designs that best suit the needs of a given species or suite of species. Local wildlife experts can help identify some of these needs. However, more research is needed on many species. Long-term monitoring can help our knowledge base to guide future projects.

Regardless of selected design, funnel-fencing is a key component to a successful wildlife crossing as it guides animals to their crossing locations.

Figure 3. Example of two different wildlife underpass designs; elk appeared reluctant to use the underpass they could not see all the way through (left), whereas elk readily used the underpass with a clear view (right).

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