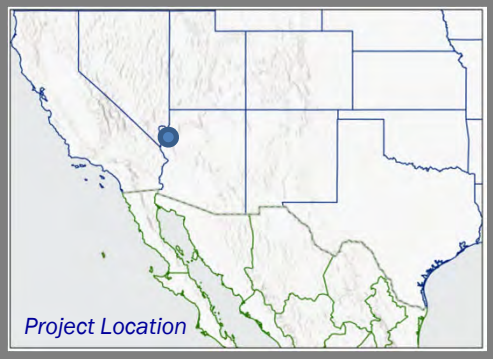
HABITAT CONNECTIONS

US Highway 93 Wildlife Overpasses: Promoting Highway Permeability and Safety for Desert Bighorn Sheep

United States Highway 93 (US93) passes through northwestern Arizona and is designated as the North American Free Trade Agreement (NAFTA) trade route and a leg of the CANAMEX (Canada to Mexico) Trade Corridor. To alleviate traffic near Hoover Dam, an alternate bypass route was constructed and portions of US93 were widened from two to four lanes. This project cuts through the northern extent of the Black Mountains where nearly 30 percent of Arizona's desert bighorn sheep population resides. Three wildlife overpasses and adjacent funnel fencing were constructed to promote habitat connectivity for sheep and reduce wildlife-vehicle collisions.



An Overpass on US Highway 93

KEY ISSUES ADDRESSED

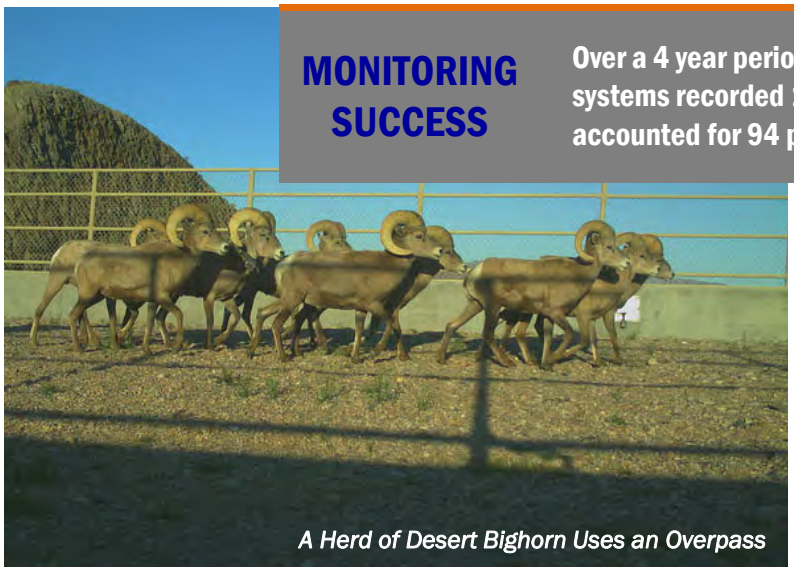
Rapid human population growth and development in the southwestern U.S., especially in Arizona, has lead to increased habitat fragmentation for many wildlife species, including desert bighorn sheep. The sheep rely on connectivity between patches of suitable habitat to maintain genetic diversity among small, isolated populations and to access resources at various times of the year. Highways diminish connectivity of sheep populations and wildlife-vehicle collisions pose an additional threat to both humans and animals. Construction of wildlife crossing features, such as overpasses and underpasses, can improve safety for motorists while also minimizing the impacts of habitat fragmentation.

PROJECT GOALS

- Assess distribution and movement of sheep prior to overpass construction
- Construct overpasses and exclusion fences
- Monitor and evaluate overpass effectiveness

MONITORING SUCCESS

Over a 4 year period after installing wildlife crossing features, the camera systems recorded 15,134 crossings by nine species. Desert bighorn sheep accounted for 94 percent of all animals documented at the structures.



A Herd of Desert Bighorn Uses an Overpass

PROJECT HIGHLIGHTS

Pre-Construction Monitoring: Prior to construction, a research team monitored the distribution and trans-highway movement of sheep in the study area for two years using GPS collars, ground observations, and tracking beds. This study identified crossing "hotspots" where natural topography and terrain were favorable.

Strategically-Located Overpasses: Pre-construction monitoring showed that bighorn were primarily utilizing elevated ridgeline areas for highway crossing, likely due to sheep's preference for wide range of visibility. These naturally elevated areas were strategically selected as overpass sites.

Multiple Crossing Options: Crossing features included three wildlife overpasses with exclusionary fencing to guide sheep to the overpasses and to additional drainage structures (three culverts and the dry washes under two bridges).

Effectiveness Monitoring: Over a 4-year period, researchers used GPS collar tracking, video and still camera surveillance, and sheep-vehicle collision data to determine the effectiveness of wildlife crossings.

Collaborators and Funding Partners

- See online for full list of collaborators and funding partners

Case study support provided by the US Fish and Wildlife Service, US Bureau of Reclamation, US Forest Service, and Cross Watershed Network. Updated November 2018.
Photos courtesy of Arizona Game and Fish Department

LESSONS LEARNED

After US93 crossing wildlife crossings were added, the sheep population continued to cross the highway to access essential resources like water, while sheep-vehicle collisions declined by 97 percent from the preconstruction figure.

90 percent of the sheep crossings occurred at the overpasses, with far fewer sheep utilizing dry washes under the bridges and at the culverts. This is likely due to the sheep's preference for wide-ranging visibility and ridgeline habitats.

As the sheep adapted to the overpasses, passage rates (the percentage of sheep that crossed after approaching the structure) significantly increased from 28 percent in year 1 to 90 percent in year 4.

Monitoring was essential in evaluating the efficacy of the crossings and providing timely data needed to make appropriate modifications to increase success. For example, exclusion fence breach points were identified and repaired during the first two years of monitoring, leading to a further reduction in sheep-vehicle collisions.

NEXT STEPS

- Continue monitoring for roadkill sheep and if any occur take steps to identify the source of sheep entry and address
- Use lessons learned to inform other highway wildlife crossing projects

PROJECT RESOURCES

For more information on this project, contact Jeff Gagnon: jgagnon@azgfd.gov

For additional project resources and case studies, visit the Collaborative Conservation and Adaptation Strategy Toolbox: WWW.DESERTLCC.ORG/RESOURCE/CCAST

A Lamb and Ewe Use an Overpass