Progress Report
Thursday, December 30, 2021

Habitat Establishment Evaluation of Tangerine Road Phase I: Road Mortality and Crossing Structure Utilization

Presented to the: Regional Transportation Authority

Submitted by the:
Arizona Game and Fish Department
Wildlife Contracts Branch

In collaboration with:

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PROJECT BACKGROUND

INTRODUCTION

Roads are a significant source of mortality for large and small species alike. Additionally, roadways are proven barriers to wildlife permeability (Forman and Alexander 1998, Spellerberg 1998, Trombulak and Frissell 2000, Forman et al. 2003, Coffin 2007) and mitigation structures such as culverts and underpasses can greatly enhance connectivity and reduce wildlife-vehicle collisions (Clevenger et al. 2001, Gagnon et al. 2011).

With the impending upgrade of Tangerine Road from I-10 to SR 77 to facilitate increasing traffic volumes, increasing wildlife-vehicle collisions and habitat fragmentation became a concern. To address these concerns, AGFD, with support from the Towns of Marana and Oro Valley and funding from the RTA conducted intensive roadkill and track surveys along Tangerine and La Cholla Roads (Lowery et al. 2011). Between May and September 2010 5,152 road mortalities representing 88 species were documented, helping to identify hot spots for future implementation of fencing and wildlife crossing structures. Individual taxonomic group hotspot locations were used to guide the most effective placement of wildlife crossings along the Tangerine Road (and La Cholla Boulevard) transportation corridor. The report recommended that the structures for medium-sized mammals be at least 6.0 ft. in height with an Openness Index of 0.40 (calculated as height x width / length, in meters). Recommendations in the report also included post-construction monitoring to determine whether any adjustments need to be made to improve effectiveness of the crossing structures and fencing.

With this information, the Tangerine Road Technical Committee worked to accommodate wildlife based on open space connectivity, considering existing and future development on either side of the structures, traffic signals, necessary hydraulic design, and fill restrictions. Once these locations were determined, the Town of Marana applied to RTA for the *Tangerine Road Corridor Project, Phase I, La Canada to Dove Mountain Boulevard, Project No. ST021, Wildlife Linkages Structure Construction.*

The objectives of this construction project were to:

- Increase the size of five drainage structures and modify inlets/outlets to accommodate medium-sized mammals.
- Add funnel fencing at the crossings.
- Conduct habitat establishment evaluations, for three seasons, beginning one year after project completion, to determine whether any adaptive management measures are necessary to improve the effectiveness of the wildlife crossing structures.

Our habitat establishment assessment project will address the last bullet of the above objectives to monitor the effectiveness of the Tangerine Rd mitigation design. Post-construction habitat

evaluations are the best means of evaluating the species that benefit from the crossing structures and fencing (Forman et al. 2003, Mata et al. 2003, Waltho and Clevenger 2003). Within the context of adaptive management, the data collected from this effort will inform future decisions to increase effectiveness (if necessary). These data will also help quantify post-construction landscape permeability for local wildlife populations and allow for comparisons with other mitigation sites in Arizona. Finally, we intend to learn from the efforts put forth by the Town of Marana, Pima County, and the Regional Transportation Authority so that future mitigation efforts benefit from information gained on Tangerine Road.

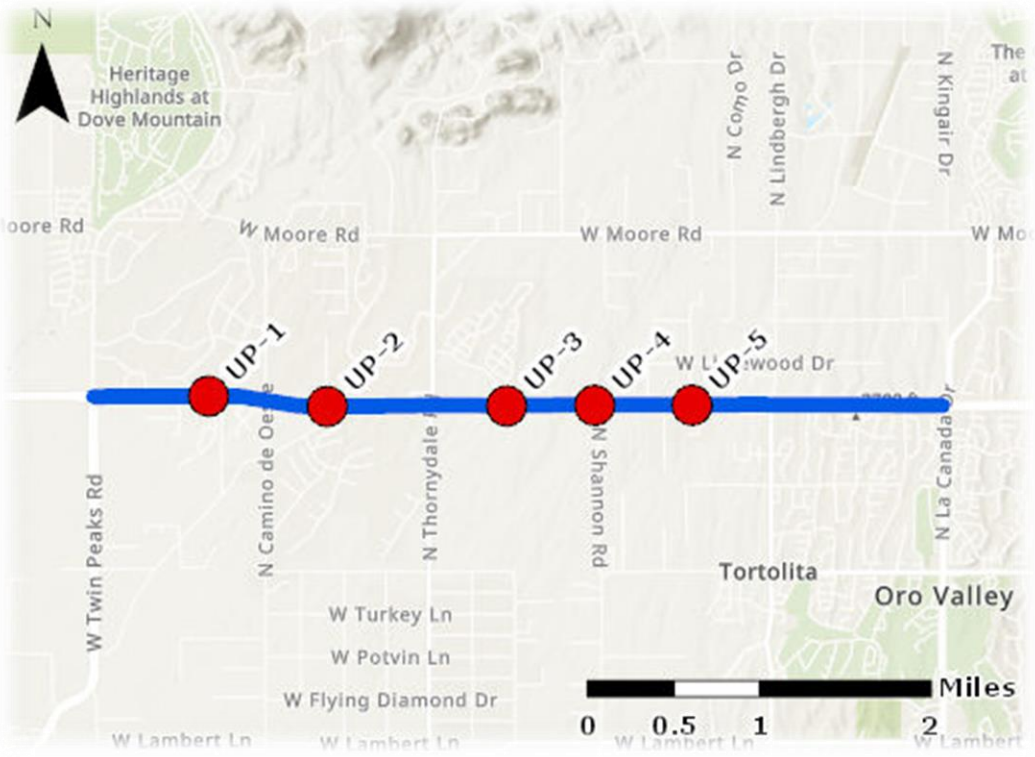

Figure 1. Overview of post-construction monitoring study area, structure locations are represented by red circles, road mortality survey extent is represented by the blue line.

Table 1. Structure names and coordinates

Reference Name	Lat	Long	Construction Descriptor
UP-1	32.424592	-111.068975	735 + 63.11
UP-2	32.423728	-111.057144	772 + 32.00
UP-3	32.423775	-111.039250	828 + 05.50
UP-4	32.423826	-111.030462	855 + 03.66
UP-5	32.423849	-111.020766	885+ 40.00

For the purposes of clarity, the five structures under monitoring have been designated by the research team as UP-1 through UP-5 from west to east. Figure 1 provides a spatial overview of their relative locations with respect to the project area, Table 1 lists their reference name, latitude, and longitude in decimal minutes, WGS 84, and construction names. The completed structures can be seen in Figures 2 thru 6, a variety of designs and dimensions are represented.

Figure 2. UP-1 viewed from the south

Figure 3. UP-2 viewed from the north

Figure 4. UP-3 viewed from the south

Figure 5. UP-4 viewed from the south

Figure 6. UP-5 viewed from the south

RESEARCH OBJECTIVES

This project will follow the methodology implemented by Lowery and Blackman (2006) for conducting road mortality surveys to make post-construction data directly comparable to pre-construction data collected in the same study area. In addition, we will install still cameras to document wildlife use of the newly constructed underpass structures.

1. Determine the effectiveness of mitigation fencing for minimizing wildlife-vehicle collisions (WVCs).

2. Determine the effectiveness of wildlife crossing structures for allowing safe passage across Tangerine Road.

Objective 1: Determine the effectiveness of mitigation fencing for minimizing wildlife-vehicle collisions (WVCs)

Because of the extensive dataset collected by Lowery et al. (2011) we are presented with the unique opportunity of a pre- and post-construction mortality comparison. We will compare the frequency of road mortalities for several taxonomic groups (i.e., amphibians, lizards, snakes, small mammals, carnivores, and ungulates) with the expectation that the frequency of road mortality should be lower on the segment of road where wildlife fencing has been installed than it is where fencing was not installed. Further, if the newly constructed fencing is effective in decreasing wildlife access to the roads, we should see a significant decrease in mortalities in areas that were not previously fenced. Focusing our data collection efforts on the peak roadkill months (May and

August) will allow for maximized potential to capture multiple species in a shorter time frame, reducing costs.

Roadway Walking Surveys

We will conduct roadkill surveys along the approximately 4-mile-long alignment between Twin Peaks Road and La Cholla Blvd (Figure 1). Additionally, we will include approximately one mile of control beyond the eastern termini of wildlife fencing near La Cholla Blvd. We will conduct road mortality surveys in May and August as these months exhibited the highest frequencies of roadkill of all species types (mammal, bird, reptile, and amphibian). We will conduct these road mortality surveys 1 year following construction and then again 3 years following construction to assess any adaptive management strategies that may be incorporated and assess long-term roadkill reduction. Because animals are often thrown from the road surface when hit by passing vehicles or move off the pavement before dying, we will survey the vegetated median and the area between the pavement and the right-of-way fencing for complete coverage within the study area. We will begin road mortality surveys thirty minutes before sunrise to minimize the loss of wildlife carcasses to scavenger activity. Two biologists will walk the alignment and document all WVCs to the most specific taxonomic level possible given the condition of the carcass (Lowery and Blackman 2006). Because Tangerine Rd will now be divided, the two field crew members will walk up one side of the road and in the median for the section of road being surveyed that day and then both return on the opposite side of the road. The field crew will alternate paths during the following survey for that segment to reduce observer bias. This will allow an evaluation of east and westbound lanes separately and combined. We will record geographic coordinates and photos of WVCs with a mobile data collection application which feeds directly into GIS layers. We will remove and/or mark all carcasses detected during surveys to prevent duplicate records being collected during subsequent surveys.

Roadway Driving Surveys

Daily walking surveys will complement daily driving surveys along the remainder of the project area. A single surveyor will drive along the edge of the paved roadway at 25 – 30 mph and scan for larger-sized mortalities (i.e., rabbit and larger) or unusual (e.g., snakes, Gila monsters, desert tortoises, etc.) wildlife that otherwise might go undetected between alternating survey segments which were not scheduled to be intensively walked until the following days. This strategy will minimize loss of detections due to scavenger removal of animal remains across the project area. In addition, this method will allow for the collection of data points which would be removed by passers-by, degraded by repeated friction by passing vehicles, and extreme environmental conditions. Roadway driving survey data will then be added to the overall road mortality database prior to analysis.

Objective 2: Determine the effectiveness of wildlife crossing structures for allowing safe passage across Tangerine Road

Given the tremendous commitment by RTA to provide wildlife crossing structures and fencing to reduce motorist collisions with wildlife and mitigate the impact of Tangerine Rd barrier effects, it is essential to evaluate their level of acceptance by Sonoran Desert wildlife. To accomplish this objective, we will utilize rapid-still frame cameras (e.g., Reconyx®) at the five crossing structures to document wildlife use patterns. Still cameras can provide detailed documentation of wildlife use and behavior in and near the newly constructed wildlife crossings along Tangerine Rd. At all structures cameras will be oriented in a manner that will allow us to evaluate the passage rate over time and compare use between structures (Dodd et al. 2007, Gagnon et al. 2011).

We will quantify species/taxonomic group-specific passage rates for each of the structures monitored and produce a species list for animals that successfully utilized the structures to move across Tangerine Road. Passage rate data will inform future implementation of similar crossing structures and can be compared with other connectivity conservation projects being conducted in the region. If passage rates for some species prove to be lower than desired, we will identify measures that could be taken to increase passage rates and promote greater permeability across the roadway.

Long-term evaluation of the wildlife crossings is essential for a proper evaluation and future recommendations (Gagnon et al. 2011), thus we will conduct three years of camera monitoring to assess learning curves. AGFD will provide all camera equipment which will be considered as a contribution to the overall monitoring project.

PROJECT UPDATES

INTRODUCTION

Post-construction monitoring of Tangerine Road Phase I began November 1st, 2018, following completion of construction activities. Post-construction monitoring has been ongoing for over three years. Previous project updates are available through the RTA or from the project implementation contacts listed in the subsequent section.

RESEARCH OBJECTIVES

Project updates since the July 9th, 2021, report are outlined by research objective in the following paragraphs.

Objective 1: Determine the effectiveness of mitigation fencing for minimizing wildlife-vehicle collisions (WVCs)

Three-year post-construction road mortality surveys were completed in August 2021. A total of 990 vertebrate road mortalities were documented during post-construction surveys. Detection numbers were broadly similar across the two survey years, 474 during one-year post-construction

surveys in 2019, and 516 during three-year post-construction surveys in 2021. Smaller species and birds accounted for the majority of mortalities across both years, although representation of constituent guilds varied (Table 2). Reptile and bird mortalities were considerably greater in 2019 than 2021, whereas small mammal mortalities were much higher in 2021.

Table 2. Post-construction road mortalities by guild

	Year		Total
	2019	2021	
Birds	**94**	**56**	**150**
Mammals	**127**	**243**	**370**
Ungulates	2	1	3
Carnivores	5	8	13
Small Mammals	102	215	317
Bats	2	3	5
Unidentifiable	16	16	32
Reptiles	**224**	**135**	**359**
Lizards	151	73	224
Snakes	73	55	128
Unidentifiable	0	7	7
Amphibians	**9**	**39**	**48**
Unidentifiable	**20**	**43**	**63**
Grand Total	**474**	**516**	**990**

Mortalities from at least 63 vertebrate species were documented across the two years, fewer species were documented in 2021 (44 species) than in 2019 (52 species). The most commonly documented species across the two years were merriam's kangaroo rat, long-nosed snake, and western banded gecko, with 66, 36, and 35 records respectively. Full species lists can be found in Appendix A.

Road mortality patterns for all vertebrates plotted by tenth mile segment show the highest mortality rates within the unfenced control section between N La Cholla Boulevard and N La Canada Drive, and around UP-1 (Figure 7). Mortalities around UP-1, UP-2, and UP-4 decreased from 2019 to 2021, numbers around UP-3 were similar in both years, while mortalities around UP-5 more than doubled.

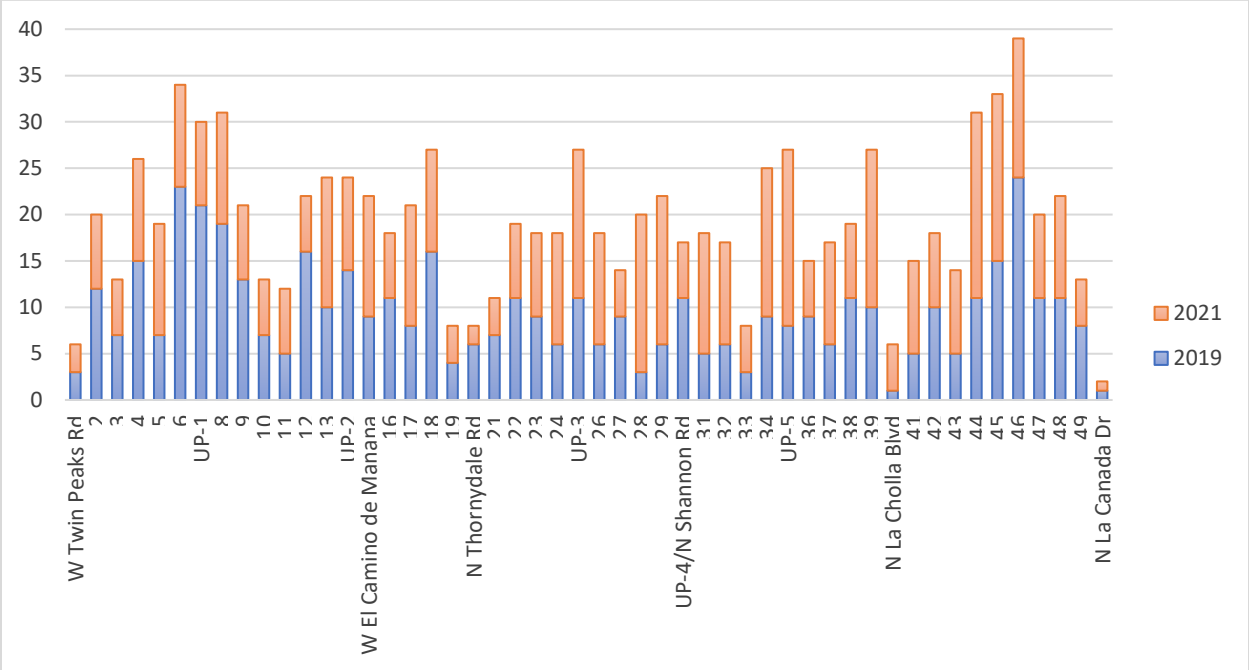

Figure 7. Vertebrate road mortalities by tenth mile from west to east

Mammal road mortalities were greater in the eastern portion of the study area (Figure 8). Mammal mortalities between W Twin Peaks Road and UP-2 were broadly similar in 2019 and 2021 whereas through the remainder of the study area mammal mortalities were generally greater in 2021 versus 2019.

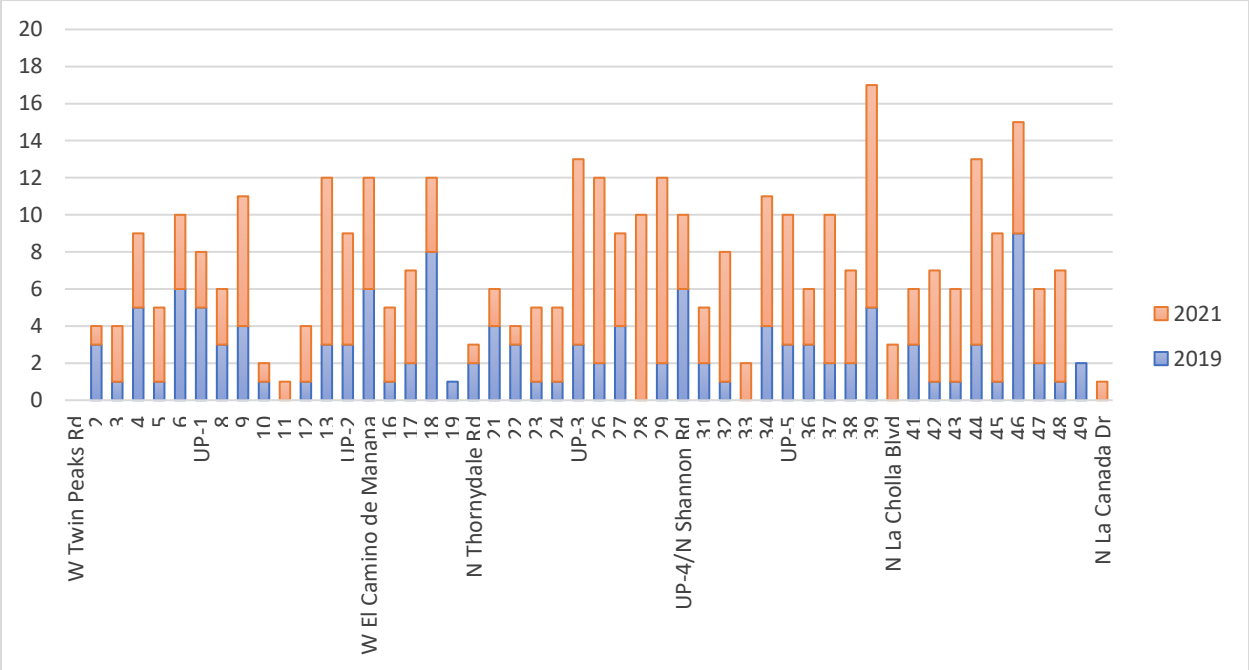

Figure 8. Mammal road mortalities by tenth mile from west to east

Reptile road mortalities were most heavily concentrated around UP-1 with less significant concentrations around UP-2, UP-5, and the unfenced sections between N La Cholla Boulevard and N La Canada Drive (Figure 9). In all areas other than around UP-5 mortalities in 2021 were much lower than in 2019.

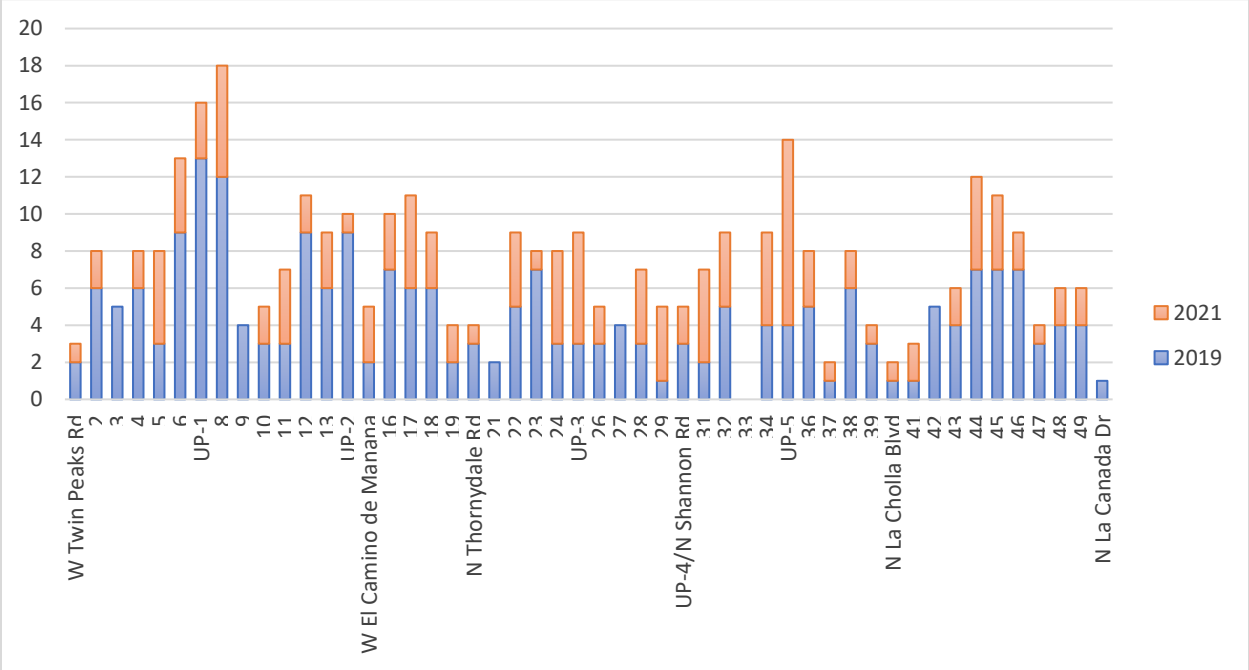

Figure 9. Reptile road mortalities by tenth mile from west to east

Bird mortalities were most heavily concentrated in the western portion of the study area between W Twin Peaks Road and W El Camino De Manana, and in the eastern portion between N La Cholla Boulevard and N La Canada Drive (Figure 10).

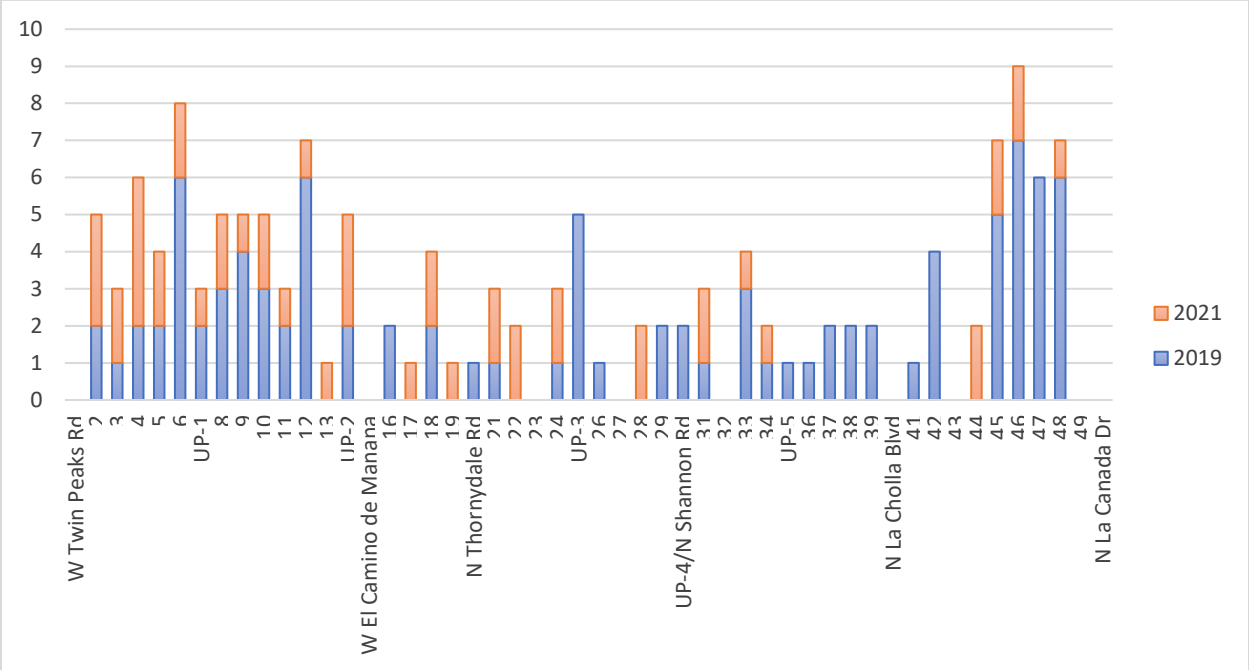

Figure 10. Bird road mortalities by tenth mile from west to east

The overall patterns suggest the lack of wildlife fence in the control section between N La Cholla Boulevard and N La Canada Drive is contributing to an increased rate of wildlife vehicle collisions versus the fenced sections to the west. Higher wildlife vehicle collision rates around UP-1 could relate to any of several factors; the smaller size of UP-1 versus the other structures within the study area and a resultant hesitancy by wildlife to utilize it, although low levels of mammal mortalities nearby and high passage rates through the structure suggest this is not the case; development patterns around this stretch may be contributing to relatively higher wildlife populations adjacent to the road; some aspect of the wildlife fence design may be contributing to increased wildlife vehicle collisions.

Road mortality peaks adjacent to crossing structures likely relate to their location at major washes which funnel wildlife into these areas. There may be aspects of the wildlife fence design around certain structures which are allowing wildlife into the right of way and may present opportunities for adaptation of the current design. Initial review of pre-construction data from 2010 suggests a reduction in road mortality numbers from the pre- to post-construction periods. The relationship between road mortality patterns and wildlife fence in situ, and comparison of the pre- and post-construction datasets will be explored further in upcoming reports.

Objective 2: Determine the effectiveness of wildlife crossing structures for allowing safe passage across Tangerine Road

Trail cameras were installed at four of the five wildlife crossing structures (UP-1, UP-2, UP-3, and UP-5) on June 20th, 2018, prior to the completion of construction activities within the project area. Construction operations continued to be staged at UP-4 until late October 2018, camera

installation at UP-4 was completed on October 31st, 2018, in conjunction with the completion of construction activities within the project area. Therefore, November 1st, 2018, is taken as the beginning of post-construction monitoring of the wildlife crossing structures. Species lists and project-wide crossing numbers in the following paragraph are reported from the date of initial camera installation at each structure while all other measures are reported from November 1st, 2018.

Crossing data has been analyzed to November 29th, 2021. A combined total of 11422 crossings by 28 wildlife species have been recorded across all five structures. Coyote, javelina, mule deer, gambel's quail, and bobcat constitute the most commonly documented species with 5473, 2992, 933, 895, and 692 crossings respectively, representing 96% of all documented crossings. Crossings of note include a gila monster at UP-4 in April 2019, and a mountain lion at UP-2 in June 2019. Figure 11 shows a selection of the images collected so far.

Figure 11. Examples of wildlife events documented at the Tangerine Rd wildlife underpasses

A total of 49 species have been detected across the five structures to date (Table 2). The greatest diversity has been observed at UP-2 where 39 species have been documented. 20 species have been detected at UP-1 which is the smallest monitored structure.

Table 2. Species detections at Tangerine Rd wildlife underpasses. Species detected and observed to have crossed denoted by 'X', those detected but not confirmed to have crossed denoted by 'D'

Species	UP-1	UP-2	UP-3	UP-4	UP-5	Overall
Abert's Towhee		D	D	D		D
American Badger		X	X	X	X	X
American Kestrel	D					D
Antelope Jackrabbit		X	X	X	X	X
Arizona Pocket Mouse		D				D
Baileys Pocket Mouse		D				D
Black-tailed Jackrabbit	D	X	X	X	X	X
Black-throated Sparrow		D				D
Bobcat	X	X	X	X	X	X
Cactus Wren	D	X	D	X	D	X
Chipping Sparrow			D	D		D
Common Raven		D	D	D		D
Coyote	X	X	X	X	X	X
Curve-billed Thrasher	D	D	D	D	D	D
Desert Cottontail	X	X	X	D	X	X
Desert Spiny Lizard		D		D	D	D
Gambel's Quail	X	X	X	X	X	X
Gila Monster				X		X
Gila Woodpecker		D			D	D
Gray Fox	X	X	X	X	D	X
Great Horned Owl		D	D	X		X
Greater Roadrunner	X	X	X	X	X	X
Green-tailed Towhee		D				D
Harris's Antelope Squirrel		D			D	D
Hog-nosed Skunk		D				D
Hooded Skunk	X	D		D		X
House Finch		D		D		D
Inca Dove		X				X
Javelina	X	X	X	X	X	X
Kit Fox	X					X
Lark Sparrow		D		D		D
Merriam's Kangaroo Rat		D				D
Mountain Lion		X				X
Mourning Dove	D	X	D	D	X	X
Mule Deer		X	X	X	X	X
Raccoon	X	X	X	X		X
Rock Pigeon	X		D			X
Rock Squirrel		D	X		X	X
Round-tailed Ground Squirrel	X	D		D	D	X
Say's Phoebe		D	D			D
Sonoran Desert Toad		D		X		X
Striped Skunk	X					X
Western Diamond-backed Rattlesnake		D				D
Western Screech Owl	D					D
White-throated Woodrat				X	D	X
White-winged Dove				D		D
Zebra-tailed Lizard		X		D		X
Unidentifiable Bat				D	X	X
Unidentifiable Hummingbird	D					D

Since passage rate monitoring began on November 1st, 2018, a total of 9576 wildlife crossings have been documented at the wildlife underpasses. Passage rates are reported for coyote, javelina, bobcat, and mule deer due to their high detectability by the installed monitoring systems, and their importance for wildlife vehicle collision mitigation. Passage rates are not reported for gambel's quail primarily because the installed camera systems do not reliably detect them under all environmental conditions.

Table 3. Observed crossings, failed crossings, and approaches with calculated passage rates for four target species at UP-1

Species	Total Crossings	Total Not Crossed	Total Approaches	Passage Rate
Bobcat	97	22	119	82%
Coyote	1857	176	2033	91%
Javelina	537	10	547	98%
Mule Deer	0	0	0	N/A

Table 4. Observed crossings, failed crossings, and approaches with calculated passage rates for four target species at UP-2

Species	Total Crossings	Total Not Crossed	Total Approaches	Passage Rate
Bobcat	107	53	160	67%
Coyote	525	208	733	72%
Javelina	242	104	346	70%
Mule Deer	45	27	72	63%

Table 5. Observed crossings, failed crossings, and approaches with calculated passage rates for four target species at UP-3

Species	Total Crossings	Total Not Crossed	Total Approaches	Passage Rate
Bobcat	173	34	207	84%
Coyote	1062	453	1515	70%
Javelina	469	117	586	80%
Mule Deer	577	284	861	67%

Table 6. Observed crossings, failed crossings, and approaches with calculated passage rates for four target species at UP-4

Species	Total Crossings	Total Not Crossed	Total Approaches	Passage Rate
Bobcat	129	42	171	75%
Coyote	1014	750	1764	58%
Javelina	1115	306	1421	79%
Mule Deer	172	92	264	65%

Table 7. Observed crossings, failed crossings, and approaches with calculated passage rates for four target species at UP-5

Species	Total Crossings	Total Not Crossed	Total Approaches	Passage Rates
Bobcat	139	45	184	76%
Coyote	781	261	1042	75%
Javelina	405	143	548	74%
Mule Deer	130	44	174	75%

Tables 3 thru 7 display the total recorded approaches, crossings, and failed crossings by structure for the four target species since November 1st, 2018. Passage rates are calculated for each species at each structure as the percentage of total crossings from the total approaches.

Passage rates for each target species vary by structure although they exceed 60% in all instances excepting coyotes at UP-4. Passage rates were particularly high at UP-1 for each target species detected, while rates at UP-5 were also relatively high, exceeding 70% for each species. Rates at the remaining three structures showed greater variation between species.

Figure 12 displays cumulative crossings of each structure for bobcat by month. Crossing accumulation rates at UP-2, UP-4, and UP-5 have been relatively consistent since early 2020. Crossings at UP-1 have accumulated at an accelerated rate since January 2021, while rates at UP-3 have been highly variable since February 2021.

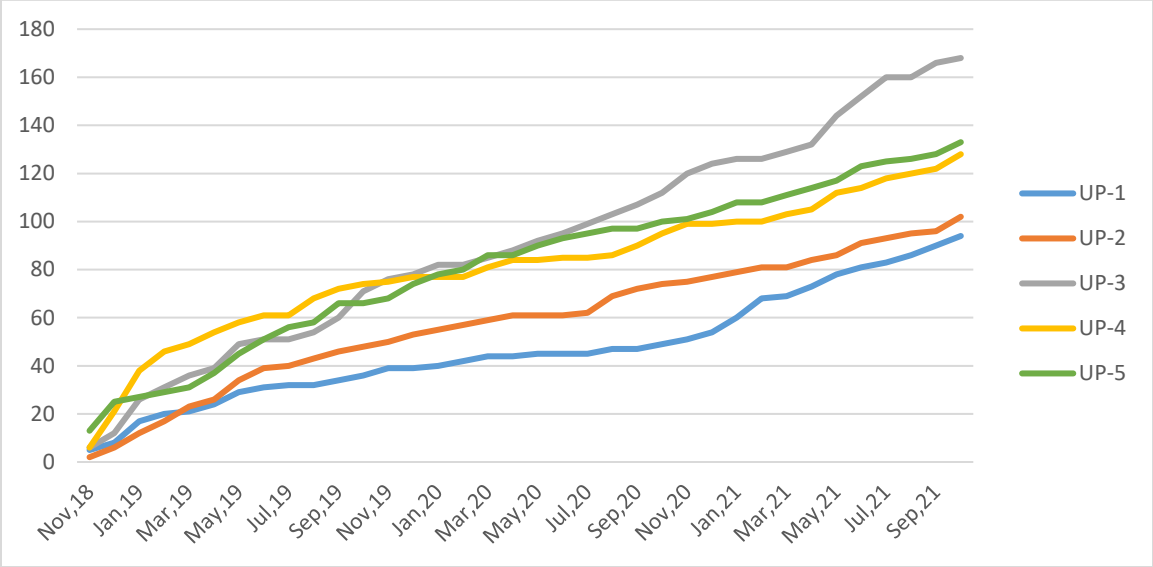

Figure 12. Cumulative use of the wildlife crossing structures by bobcat since November 1st, 2018

Crossing accumulation rates for coyote have been very consistent at UP-3, UP-4, and UP-5 since May 2019 (Figure 13). Rates at UP-2 have been largely consistent although an upturn in crossing accumulation rates was observed between August 2020 and January 2021. Crossing rates at UP-1 have remained consistently high, accelerating during the winter, and slowing through the summer months.

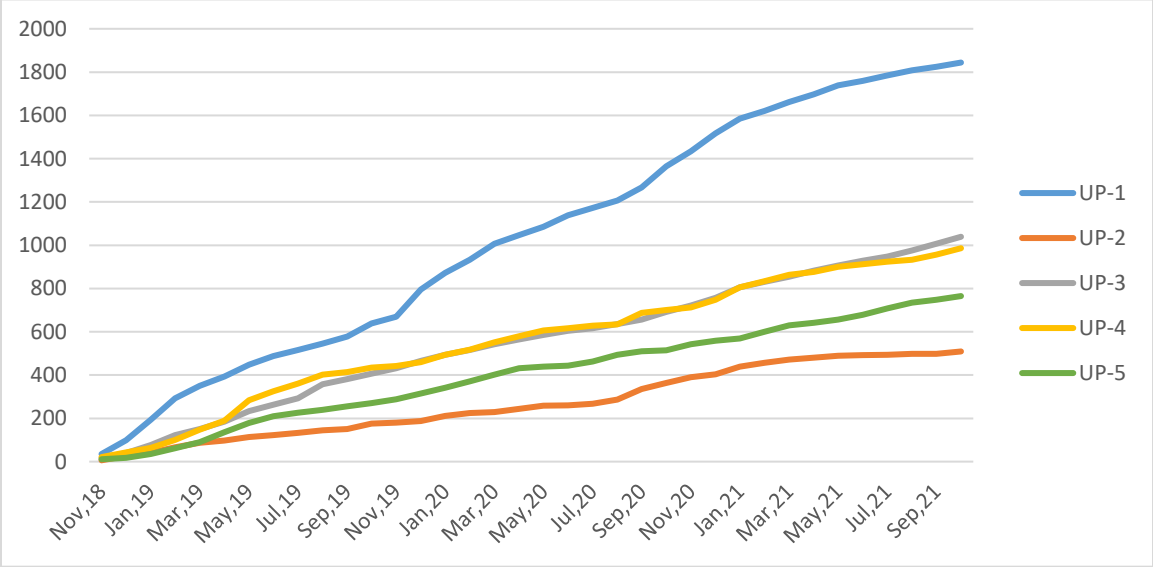

Figure 13. Cumulative use of the wildlife crossing structures by coyote since November 1st, 2018

Crossing rates for javelina were slower to establish (Figure 14). Crossing accumulation rates at most structures have been relatively consistent since early 2020. However, rates at UP-3 have been less consistent since April 2021 with periods of accelerated crossing accumulation broken by periods of more typical crossing rates.

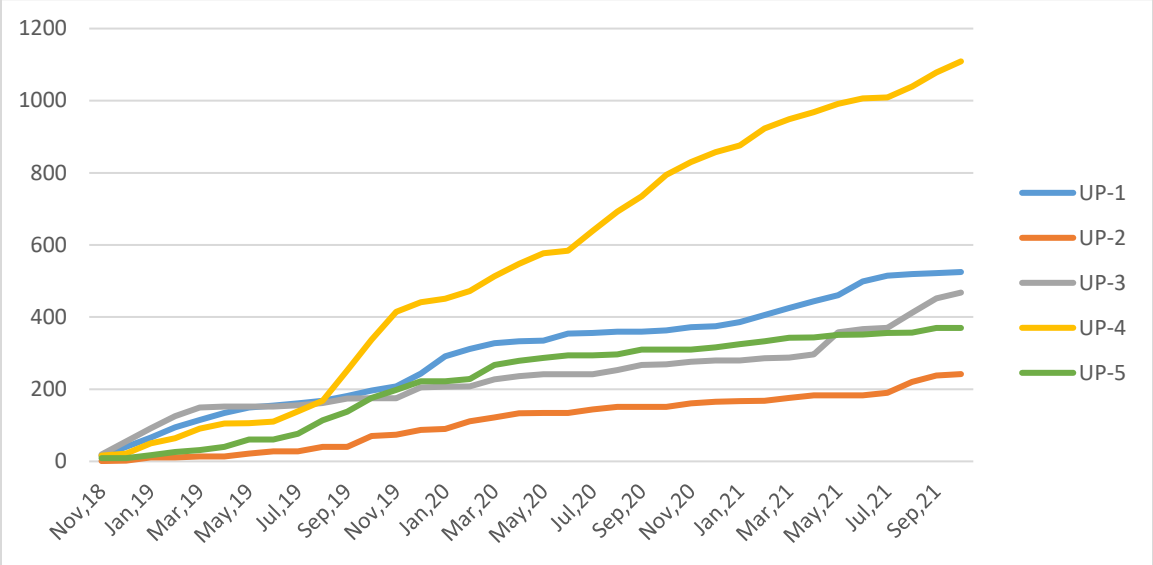

Figure 14. Cumulative use of the crossing structures by javelina since November 1st, 2018

Mule deer crossings were the slowest to establish (Figure 15). UP-3, the most heavily utilized structure, saw regular use beginning September 2019 with crossings accumulating at a steady rate to November 2020 then increasing considerably from that point to April 2021. Since April, crossing rates at UP-3 have slowed considerably. UP-4, the next most heavily utilized structure began to accumulate regular crossings from January 2020, crossing rates slowed from May to October of 2020 but have again begun to accumulate since then. Crossing rates at UP-5 have been fairly consistent since February 2021, while crossings at UP-2 have begun to accumulate at a relatively steady but low rate since August 2020. Mule deer have not yet been documented to approach UP-1.

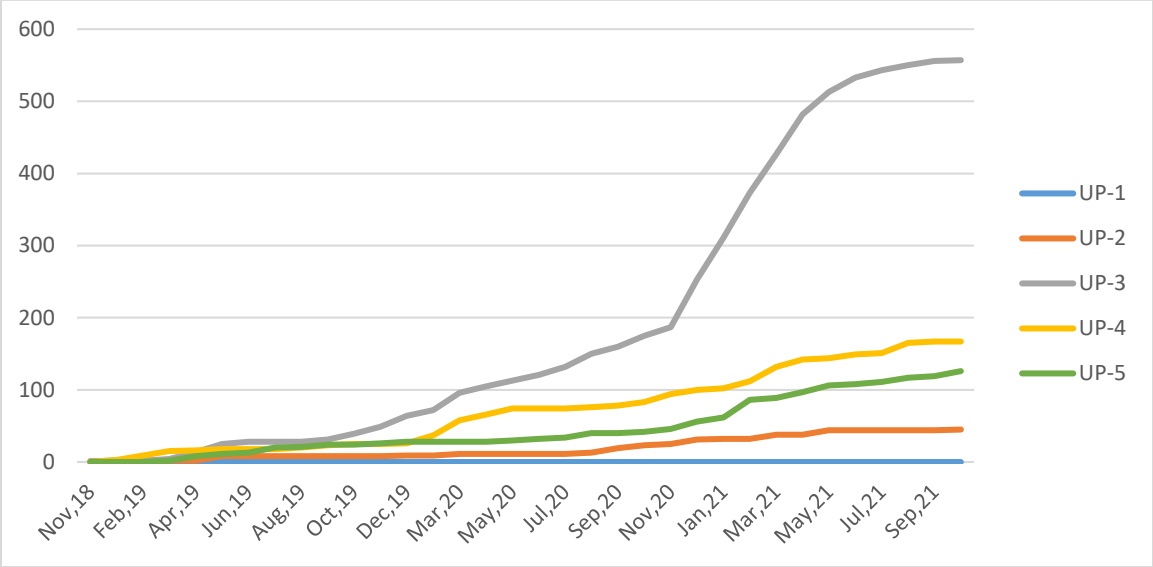

Figure 15. Cumulative use of the wildlife crossing structures by mule deer since November 1st, 2018

PROJECT SCHEDULE AND DELIVERABLES

PROJECT DELIVERABLE	**COMPLETION DATE(S)**
Install still cameras at crossings	Completion of Phase I
Conduct weekly road mortality surveys during peak mortality periods	May and August 1 year and 3 years following completion of project
Collect, review, and enter camera data	Continuous – 3 years
Summarize data, prepare, and submit draft final report for review, submit revised final report	Year 4-5

PROJECT IMPLEMENTATION CONTACTS

Arizona Game and Fish Department will oversee implementation of mitigation monitoring with the following team members:

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APPENDIX A

Species	2019	2021	Total
Birds	**94**	**56**	**150**
Abert's Towhee	2	1	3
Black-chinned Hummingbird	1		1
Cactus Wren	6	1	7
Cassin's Kingbird	1		1
Common Nighthawk		1	1
Common Raven	1		1
Costa's Hummingbird	1		1
Curve-billed Thrasher	2		2
Gambel's Quail	2	2	4
Gila Woodpecker	1		1
House Finch		1	1
House Sparrow	4	5	9
Lucy's Warbler	1		1
Mourning Dove	8	2	10
Northern Mockingbird	1	1	2
Red-tailed Hawk	1		1
Verdin	2		2
Western Tanager		1	1
White-winged Dove	1	1	2
Unidentifiable Bird	28	22	50
Unidentifiable Dove	17	5	22
Unidentifiable Songbird	14	12	26
Unidentifiable Sparrow		1	1
Mammals	**127**	**243**	**370**
Antelope Jackrabbit	2		2
Arizona Pocket Mouse		2	2
Bailey's Pocket Mouse	2		2
Black-tailed Jackrabbit		1	1
Coyote	5	7	12
Desert Cottontail	5	11	16
Desert Pocket Mouse	2	1	3
Harris's Antelope Squirrel		1	1
Javelina	1	1	2
Merriam's Kangaroo Rat	31	35	66
Mule Deer	1		1
Round-tailed Ground Squirrel		1	1
White-throated Woodrat	7	9	16
Unidentifiable Mammal	16	16	32
Unidentifiable Molossid Bat		2	2
Unidentifiable Rabbit	4	2	6
Unidentifiable Rodent	41	123	164
Unidentifiable Silky Pocket Mouse	3	10	13
Unidentifiable Spiny Pocket Mouse	5	14	19
Unidentifiable Squirrel		4	4
Unidentifiable Vesper Bat	2	1	3
Unidentifiable Carnivore		1	1
Unidentifiable Deer Mouse		1	1

Reptiles	**224**	**135**	**359**
Clark's Spiny Lizard	4		4
Coachwhip	1	1	2
Common Kingsnake	6	6	12
Common Side-blotched Lizard	16	10	26
Desert Spiny Lizard	19	8	27
Gila Monster	5	1	6
Glossy Snake	3		3
Gophersnake	8	14	22
Greater Earless Lizard	2		2
Lesser Earless Lizard	8	1	9
Long-nosed Leopard Lizard	1		1
Long-nosed Snake	30	6	36
Nightsnake	4		4
Ornate Tree Lizard	2	6	8
Regal Horned Lizard	5	3	8
Sidewinder	2	1	3
Tiger Whiptail	1	1	2
Unidentifiable Phrynosoma	1		1
Unidentifiable Rattlesnake	1		1
Unidentifiable Reptile		7	7
Variable Sandsnake	2	2	4
Western Banded Gecko	32	3	35
Western Diamond-backed Rattlesnake	4	8	12
Western Shovel-nosed Snake	1		1
Western Threadsnake		11	11
Zebra-tailed Lizard	13	1	14
Unidentifiable Gecko		1	1
Unidentifiable Large Snake	3	2	5
Unidentifiable Lizard	16	31	47
Unidentifiable Small Lizard	26	5	31
Unidentifiable Small Snake	1		1
Unidentifiable Snake	7	4	11
Unidentifiable Spiny Lizard		2	2
Amphibians	**9**	**39**	**48**
Couch's Spadefoot	3	9	12
Great Plains Toad		1	1
Mexican Spadefoot	1		1
Red-spotted Toad	1	2	3
Sonoran Desert Toad	4	14	18
Unidentifiable Amphibian		3	3
Unidentifiable Toad		9	9
Unidentifiable Spadefoot		1	1
Unidentifiable	**20**	**43**	**63**
Unidentifiable Vertebrate	20	43	63