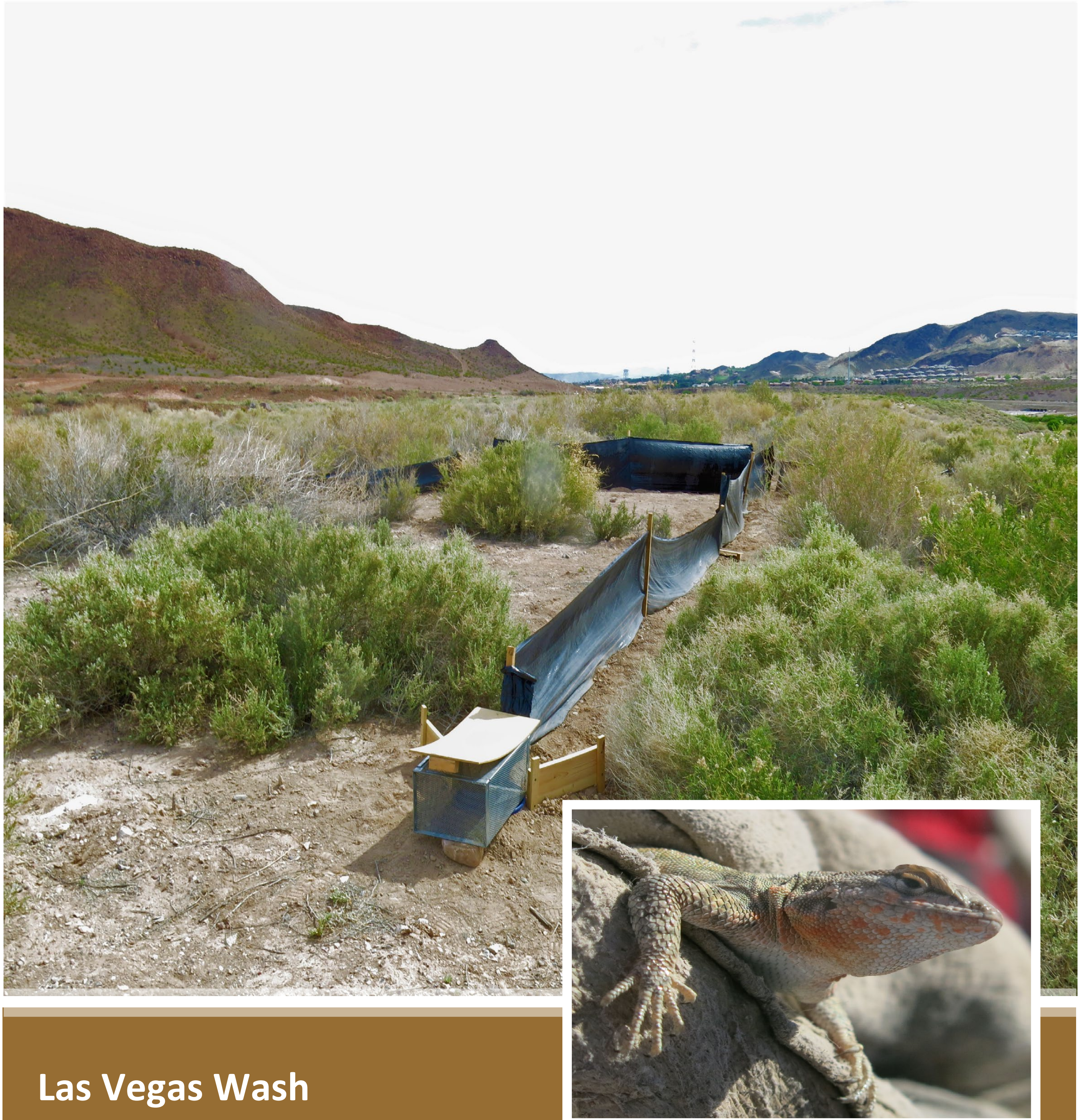

Las Vegas Wash
Reptile Survey, 2019

March 2023

LVWCC

Las Vegas Wash Reptile Survey, 2019

SOUTHERN NEVADA WATER AUTHORITY
Las Vegas Wash Project Coordination Team

Prepared for:

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ABSTRACT

For more than 20 years, the Las Vegas Wash Coordination Committee (LVWCC) has worked to stabilize and enhance the Las Vegas Wash (Wash), which drains urban and storm flows from the Las Vegas Valley to Lake Mead. The LVWCC has installed 21 weirs and revegetated hundreds of acres with native plants, resulting in significant habitat changes. Project staff conducted biological studies and published the Las Vegas Wash Wildlife Management Plan in 2008, which established management objectives and recommended actions, including additional monitoring. From 2001 to 2003, the first iteration of trapping reptiles took place along the Wash. During these initial surveys, 12 species were captured in 2001 (nine lizards and three snakes), eight species in 2002 (seven lizards and one snake), and 11 species in 2003 (nine lizards and two snakes). This report summarizes the second iteration of the study, which ran from April through September 2019. Nine species (seven lizards and two snakes) were captured within four different habitat types: 1) creosote bush-saltbush scrub; 2) cottonwood-willow riparian forest; 3) mesquite woodland; and 4) saltbush scrub. A 10th species, Great Basin collared lizard, was observed but not captured. These results were in keeping with the prior study.

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1.0 INTRODUCTION

The Las Vegas Wash (Wash) carries treated wastewater, storm flows, urban runoff, and shallow groundwater from the Las Vegas Valley to Lake Mead. Historically, it was a typical desert wash, channeling flows during storm events, but as the valley's population grew, the Wash became a perennial stream as a result of the discharge of treated wastewater into the channel. Continually increasing flows and periodic flooding from storms caused extensive erosion of the Wash's bed and banks. In 1998, the Las Vegas Wash Coordination Committee (LVWCC) was formed to properly manage and protect the Wash, which flows through the Clark County Wetlands Park (Wetlands Park; Figure 1). This group brought federal, state, and local agencies; businesses; environmental groups; the University of Nevada, Las Vegas; and citizen members together to address the degradation of the Wash. The LVWCC drafted and approved the Las Vegas Wash Comprehensive Adaptive Management Plan (CAMP; LVWCC 2000), which established 44 action items to stabilize the Wash and restore ecosystem functions.

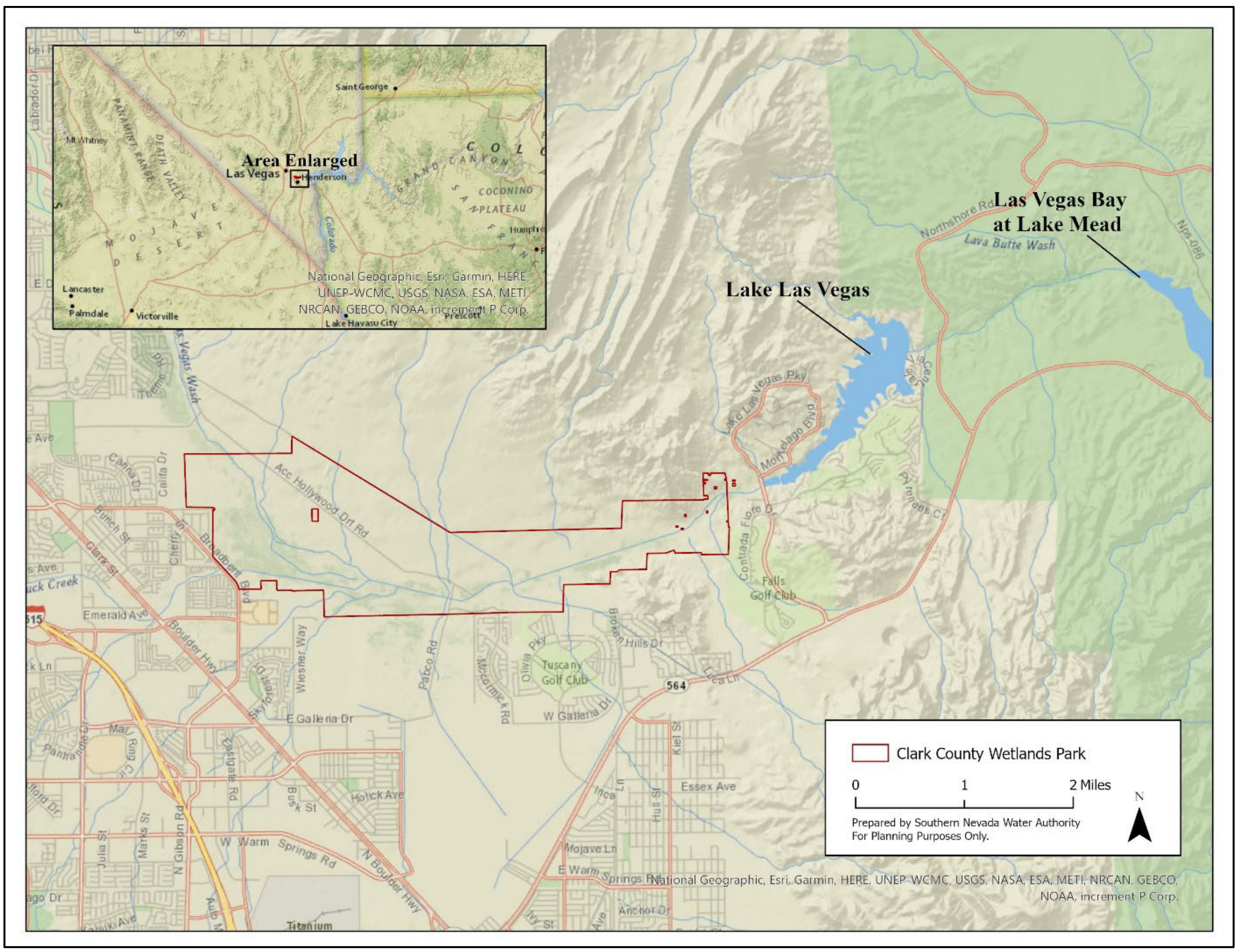

Figure 1. Clark County Wetlands Park location and boundary.

One of the CAMP action items called for the creation of a long-term fish and wildlife management plan. Consequently, the Las Vegas Wash Project Coordination Team (Wash Team) conducted baseline studies of various taxa and published the Las Vegas Wash Wildlife Management Plan (WMP; Shanahan et al., 2008b). The WMP has three main objectives: 1) conserve the abundance and diversity of native wildlife species that have been found along the Wash, 2) protect and enhance wildlife habitats, and 3) increase environmental awareness of these resources in the community (Shanahan et al., 2008b). A recommended action to conserve native species is to regularly monitor the abundance and diversity of wildlife.

During 2001–2003, the Wash Team conducted a baseline inventory of reptiles along the Wash, trapping lizards and snakes within different habitats (Shanahan 2005). Prior to this study, the last known inventory of reptiles in the area was conducted by Bradley and Niles (1973), who developed a general list of vertebrates and vascular plants. Their information on lizards and snakes was derived from a mix of field observations and species assumed to be present based on distributional data.

Habitats along the Wash have changed dramatically with the construction of weirs and native revegetation to stabilize the waterway. In 1998, Wash vegetation was dominated by non-native salt cedar (*Tamarix ramosissima*), and the channel was narrow, with fast-moving water. By the end of 2003, the LVWCC had constructed seven weirs and revegetated approximately 50 acres, beginning to slow Wash flows and stabilize its banks; by 2019, there were 21 weirs and over 500 acres revegetated.

Such changes have the potential to impact wildlife in the area. The Wash Team completed the present study in 2019 to once again monitor the abundance and diversity of reptiles as recommended in the WMP and to compare results to those from the 2001–2003 study.

2.0 MATERIALS AND METHODS

Since reptiles are ectothermic, they cannot produce their own body heat and must rely on their surrounding environment to maintain it. Most species are not active during the winter months. Consequently, sampling was limited to the warmer months of April through September.

A drift fence array trapping methodology (e.g., Corn 1994) was used that was similar to Fisher et al. (2002). The array included pitfall traps, funnel traps, and coverboards. The design of the arrays was modified for this survey. Specifically, the array design was a “Y” configuration with seven pitfall traps (i.e., five-gallon buckets) placed into the ground, level with the ground surface. A fence material was placed approximately 18 inches high between each of the buckets. For this survey, a box funnel trap was placed at the end of each “Y” configuration, instead of the previously used tubular funnels (Appendix A). Coverboards were placed above each trap for environmental protection, and three-inch round diameter cut PVC pipes were placed in each bucket for additional cover and/or warmth.

The study followed a recommendation of Shanahan (2005) to include rehabilitated riparian sites and reduce the number of upland sites to get a better understanding of how restoration efforts are impacting reptiles in these areas. Although extensive revegetation was completed in the intervening years, arrays were placed in five locations near, or adjacent to, previous survey sites for comparison (Figure 2). Array vegetation types included: 1) creosote bush-saltbush scrub, 2) cottonwood-willow riparian forest, 3) mesquite woodland, and 4) saltbush scrub (Table 1). These

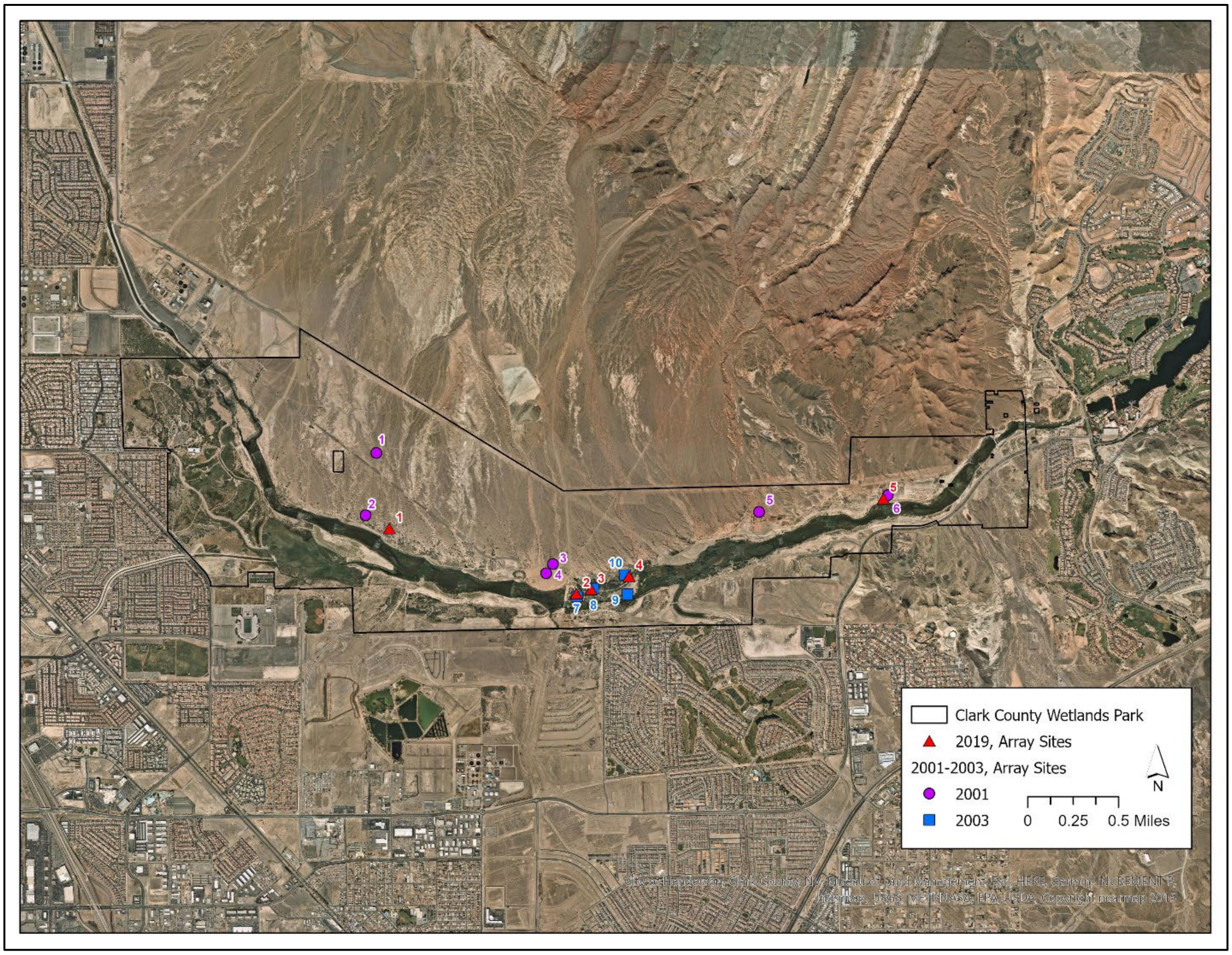

Figure 2. Location of reptile arrays in current and past surveys along the Las Vegas Wash.

vegetation types were described in Land Cover Types of the Las Vegas Wash (Shanahan et al. 2008a). Site 1 was the only site that was not disturbed during construction or had any restoration efforts. It was comprised of creosote bush (*Larrea tridentata*) and desert saltbush (*Atriplex polycarpa*). Sites 2–5 were all cleared of existing vegetation during construction and subsequently replanted with native vegetation. Site 2 was revegetated in April 2001; the primary cover around the array was cottonwood (*Populus fremontii*), velvet ash (*Fraxinus velutina*), and desert willow (*Chilopsis linearis*). Site 3 was revegetated in April 2007 with honey mesquite (*Prosopis glandulosa* var. *torreyana*) and screwbean mesquite (*P. pubescens*). Site 4 was planted in 2007 with an overstory of cottonwood and seep willow (*Baccharis salicifolia*) along the edges. Site 5 was hydroseeded in

Array Number	Habitat Type
1	**Creosote Bush-Saltbush Scrub**
2	**Cottonwood-Willow Riparian Forest**
3	**Mesquite Woodland**
4	**Cottonwood-Willow Riparian Forest**
5	**Saltbush Scrub**

Table 1. Habitat types at each array site.

December 2010 with desert saltbush and fourwing saltbush (*A. canescens*), the only species found near the array.

The traps within the arrays were opened on a Monday and were sampled Tuesday, Wednesday, and Thursday between 0600 and 1200 hours and then closed and reopened two weeks later. Although the Wash Team focused on collecting reptiles, small mammals, and toads were incidentally captured and identified to species. Lizards were examined to determine: 1) age (neonate, juvenile, or adult), 2) length (mm), 3) mass (g), 4) sex (male or female), 5) parasite load, and 6) tail regeneration. This information was recorded on a field datasheet (Appendix B). Before release, lizards were marked with a paint pen on the neck for recapture identification (Figure 3). Snakes were identified to species. No other information was collected on snakes.

Figure 3. Western whiptail lizard marked for recapture.

Environmental measurements such as air temperature and precipitation were also monitored during the study. Temperature (F) was recorded at approximately 5 feet and 2 inches above the ground surface at the beginning and end of all survey days. Precipitation data was collected at two Clark County Regional Flood Control District (CCRFCD) rainfall gauges near the array sites (Figure 4).

Figure 4. Precipitation gauges near reptile survey array sites along the Las Vegas Wash.

From the study data, staff generated a species list, tallied species richness and abundance, and calculated relative capture frequency (relative frequency) and capture rate to compare results with Shanahan (2005). Relative frequency was determined by dividing the number of individuals of a species by the total number of individuals for all species captured. Changes in relative frequency can provide an indication of changes in abundance or activity. Capture rates were calculated by dividing the number of individuals trapped by the number of array nights, with the number of array nights calculated by multiplying the number of arrays by the number of nights the traps were open.

3.0 RESULTS

Nine species (seven lizards and two snakes) were captured during the six-month study in 2019 (Table 2, Appendix C). Great Basin collared lizard was observed near Site 5 but not captured. Six of the nine species were captured in all four years: 1) western whiptail lizard, 2) side-blotched lizard, 3) yellow-backed spiny lizard, 4) desert iguana, 5) zebra-tailed lizard, and 6) western banded gecko.

Common Name	Scientific Name	Code	Year Observed 2001	2002	2003	2019
Western whiptail lizard	*Aspidoscelis tigris*	ASTI	x	x	x	x
Zebra-tailed lizard	*Callisaurus draconoides*	CADR	x	x	x	x
Western banded gecko	*Coleonyx variegatus*	COVA	x	x	x	x
Mojave Desert sidewinder	*Crotalus cerastes cerastes*	CRCE	x*			
Great Basin collared lizard	*Crotaphytus bicinctores*	CRBI			x	x*
Desert iguana	*Dipsosaurus dorsalis*	DIDO	x	x	x	x
Long-nosed leopard lizard	*Gambelia wislizenii*	GAWI	x		x	
Common kingsnake	*Lampropeltis getula*	LAGE	x			x
Western blind snake	*Leptotyphlops humilis*	LEHU	x		x	
Red racer	*Masticophis flagellum piceus*	MAFL		x	x	x
Desert horned lizard	*Phrynosoma platyrhinos*	PHPL	x	x	x*	
Great Basin gopher snake	*Pituophis catenifer deserticola*	PMDE	x			
Yellow-backed spiny lizard	*Sceloporus uniformis*	SCUN	x	x	x	x
Side-blotched lizard	*Uta stansburiana*	UTST	x	x	x	x
Yucca night lizard	*Xantusia vigilis vigilis*	XAVI	x		x	x

* species not captured

Table 2. Reptile species encountered during previous and current surveys along the Las Vegas Wash.

Species richness varied seasonally and by habitat type and site. The creosote bush-saltbush scrub habitat (Site 1) had the highest richness with seven species, while saltbush scrub alone (Site 5) had the lowest with just four (Figure 5). The mesquite woodland (Site 3) had six species as did the cottonwood-willow riparian forest (Sites 2 and 4); however, each riparian site had only four species that combined for the six total. Species richness was highest in May (n = 7) followed by June (n = 6) and the lowest in April (n = 2). July and September each had three species.

Some species showed high capture rates for specific habitats. Red racers were captured 60% in the mesquite woodland habitat, 80% of desert iguanas were captured in the creosote bush-saltbush scrub, and 77% of yellow-backed spiny lizards were captured in the cottonwood-willow riparian forest. The most abundant two species, the western whiptail lizard and the side-blotched lizard were the only two species caught at all five sites. The western whiptail was captured a total of 64 times within the saltbush scrub (Figure 5). Some species were only captured in specific habitats, the desert iguana and the yucca night lizard were both only captured in the creosote bush-saltbush scrub and the mesquite woodland. The western banded gecko was captured in both creosote bush-saltbush scrub and cottonwood-willow riparian forest.

Only six snakes were captured: one common kingsnake and five red racers. One common kingsnake and four red racers were captured in funnel traps and one red racer was captured in a pitfall trap.

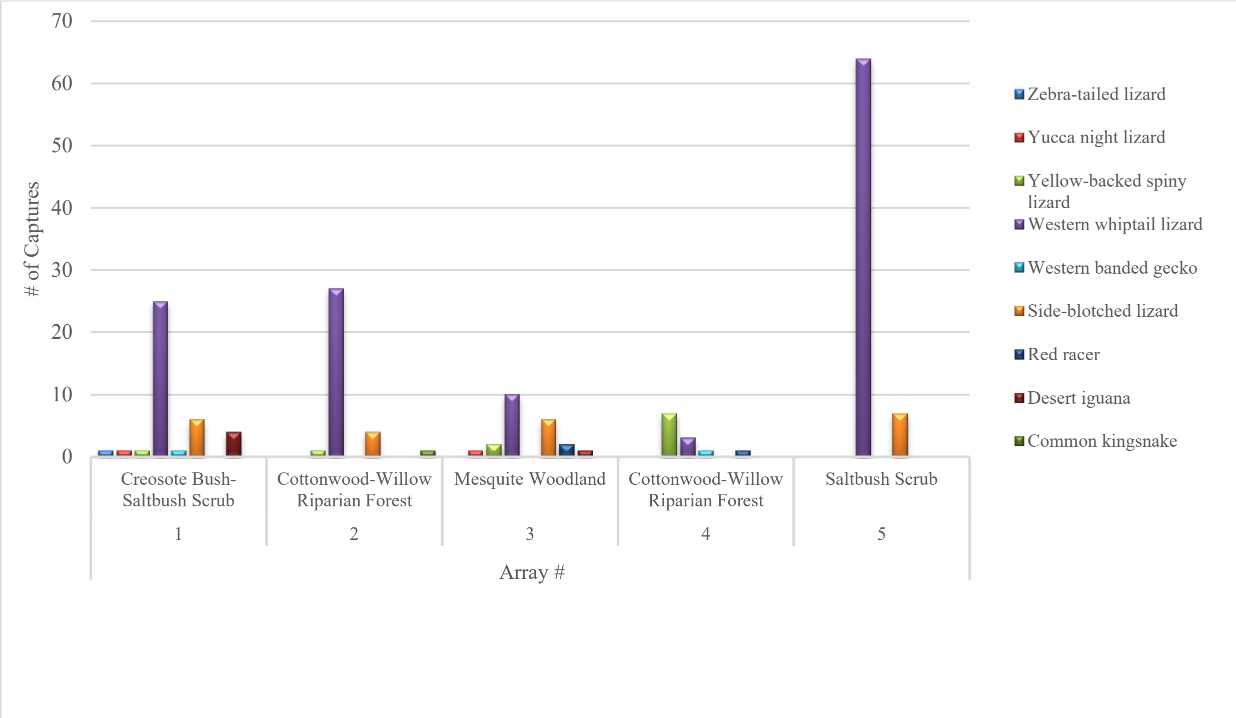

Figure 5. Reptile species richness at each of the six arrays during the 2019 study.

A total of 194 individuals were captured during April–September over 180 nights, resulting in a capture rate of 1.08 per trap night (Table 3). Only 5.1% (n = 10) of lizards were recaptured. Consequently, population estimates based on mark-recapture data were not calculated. Relative frequencies for all species were compiled (Table 4). The western whiptail lizard had the highest relative frequency of all species captured for all years with 72% of the captures. The side-blotched lizard was second most captured species with 24 captures with a relative frequency of 12.37%. Other species observed in decreasing order of relative frequency included the yellow-backed spiny lizard at 6.7%, the desert iguana and the red racer both at 2.58%, the western banded gecko at 1.55% and the yucca night lizard at 1.03%. The remaining two species the common kingsnake and the zebra-tailed lizard were both captured only once with a relative frequency of .52%.

Year	2001	2002	2003	2019
Total Individual Captures	111	72	193	194
Array Nights	162	270	480	180
Capture Rate (capture/array night)	0.69	0.27	0.40	1.08

Table 3. Total number of reptiles captured per array night in the during the previous and current study.

Individuals were captured each month, with the most captures in June (n = 55) followed by May (n = 44). The least captures were in September (n = 10) followed by April (n = 13).

The precipitation data collected at the CCRFCD gauge sites during April-September collected 0.95 inches at the Pabco Road Gauge and 1.62 inches at the Three-Kids Gauge. May alone collected 0.79 inches at the Pabco Road Gauge and 1.26 inches at the Three-Kids Gauge. Air and ground temperatures were taken at the beginning and end of each survey day. Air temperatures ranged during that period from 64 ^{o}(F) in April to 108 ^{o}(F) in July. Ground temperatures ranged from 66 ^{o}(F) in April to 133 ^{o}(F) in August.

In addition to lizards and snakes, five species of small mammal and one amphibian species were trapped: desert pocket mouse (*Chaetodipus penicillatus*; n = 9), round-tailed ground squirrel (*Xerospermophilus tereticaudus*; n = 1), Merriam's kangaroo rat (*Dipodomys merriami*; n = 2), little pocket mouse (*Perognathus longimembris*; n = 6), desert cottontail (*Sylvilagus audubonii*; n = 2), and Woodhouse's toad (*Anaxyrus woodhousii*; n = 21).

Common Name	2001 (6 arrays)		2002 (6 arrays)		2003 (10 arrays)		2019 (5 arrays)	
	Individual Captures	Relative Frequency	Individual Captures	Relative Frequency	Individual Captures	Relative Frequency	Individual Captures	Relative Frequency
Western whiptail lizard	67	60.36%	37	51.39%	111	57.51%	140	72.16%
Zebra-tailed lizard	1	0.90%	1	1.39%	1	0.52%	1	0.52%
Western banded gecko	1	0.90%	5	6.94%	16	8.29%	3	1.55%
Great Basin collared lizard					2	1.04%		
Desert iguana	5	4.50%	8	11.11%	2	1.04%	5	2.58%
Long-nosed leopard lizard	1	0.90%			1	0.52%		
Common kingsnake	1	0.90%					1	0.52%
Western blind snake	1	0.90%			1	0.52%		
Red racer			1	1.39%	2	1.04%	5	2.58%
Desert horned lizard	3	2.70%	1	1.39%				
Great Basin gopher snake	1	0.90%						
Yellow-backed spiny lizard	5	4.50%	3	4.17%	13	6.74%	13	6.70%
Side-blotched lizard	24	21.62%	16	22.22%	43	22.28%	24	12.37%
Yucca night lizard	1	0.90%			1	0.52%	2	1.03%

Table 4. Number of individuals trapped and relative frequency for reptile surveys during 2001, 2002, 2003, and 2019.

A wide variety of invertebrates were also observed and identified in the pitfall traps. Fourteen new species were added to the list of known invertebrates along the Wash. This included two species of ants, three beetles, three spiders, the western short-horned walkingstick (*Parabacillus hersperus*) and the yellow ground scorpion (*Paravaejovis confuses*).

4.0 DISCUSSION

Habitat restoration and weir construction along the Wash have changed vegetation communities from non-native salt cedar-dominated habitat to saltbush-, native riparian-, and mesquite-dominated habitats. While these restoration efforts have created native habitats, they have not substantially changed the reptile community. The western whiptail lizard and side-blotched lizards were still the most abundant species in 2019, as they were in the 2001–2003 study. The highest species richness recorded during the baseline study was in 2001 with 12 species. In 2002, however, species richness decreased by 33%, to eight, without any substantial changes in habitat. By 2003, lizard richness was back near 2001 levels and snake richness had increased from one species in 2002 to two species in 2003. Thus, the richness in 2019 did not differ substantially from the three years of baseline data, falling within the previously documented annual variability.

Rainfall patterns may have influenced the abundance of reptiles by the increase of vegetative growth and insects. Shanahan (2005) recommended to initiate another survey during the spring of a substantial El Nino. The 2018-2019 was an El Nino year, unfortunately it was only a mild event. However, during the month of May, the CCRFCD precipitation gauges recorded 0.79 inches at the Pabco Road Gauge and 1.26 inches at the Three-kids Gauge. During the 2001-2003 study there was no precipitation recorded during the month of May. This may have been why May and June were the highest for richness and abundance.

Site 1, which had both creosote bush and saltbush, captured four of the five desert iguanas. This species has been documented to associate with creosote as a source of food and refuge (Minnich and Shoemaker 1970). Site 1 also captured three of the four desert iguanas on the same day: June 18. This was also the most abundant capture day, with 19 individuals: western whiptail lizard (n = 15), desert iguanas (n = 3), and yucca night lizard (n = 1). The two yucca night lizards captured were during the month of June (n = 2).

The inclusion of native riparian sites was a recommendation in Shanahan (2005). So, this survey included two riparian restoration sites (Sites 2 and 4). Six different species were captured at these sites. These sites captured 10 of the 13 yellow-backed spiny lizards. Site 4 alone captured 8 of the 10 yellow-backed spiny lizards. Site 4 differed from Site 2 by composition and structure with an enclosed canopy of predominantly cottonwoods that are amongst the largest along the Wash. Site 2 was more of a mixed riparian area with an open canopy. Site 4 is similar to other studies (Bateman & Ostoja 2012) that have linked yellow-backed spiny lizards to areas having high densities of large diameter native trees, woody debris, and deep leaf litter because spiny lizards often forage on large trees within riparian areas in the American Southwest (Vitt et al. 1981).

Site 3 was in mesquite habitat and captured three of the five red racers. This site also had the most captures of small mammals. The red racer may have had a preference to this area for the cover and more abundant food source.

Site 5, a hydroseeded saltbush scrub habitat captured four species but nearly half of all western whiptail lizard captures over the study. The site was predominantly desert saltbush and fourwing saltbush with a total cover of 50-75% (Eckberg and Wuest, 2020). The invertebrate food resources must have been abundant within these two saltbush plant species that attracted the western whiptail lizards to this site.

5.0 RECOMMENDATIONS

It is recommended that a fifth iteration of this study be completed in the next 5-10 years. The WMP for effectiveness monitoring recommends that a study for chuckwalla (*Sauromalus ater*) and long-tailed brush lizards (*Urosaurus graciosus*) be conducted. Both species were not captured during the four years of surveys.

The chuckwalla a covered species under the Clark County Multiple Species Habitat Conservation Plan (CCMSHCP) prefers rocky desert habitat and the long-tailed brush lizard prefers desert wash and desert scrub. These habitats have not been targeted on and could result in a better understanding of these species' distribution and abundance within the Wetlands Park.

The desert horned lizard also a covered species under the CCMSHCP was not captured in 2019, only low numbers captured in the 2001–2003 study (Table 4; Shanahan 2005). This species was observed previously within sandier upland areas located further away from the Wash. The long-nosed leopard lizard was also not captured during this survey, but one was captured in both 2001 and 2003. This species has been observed in similar habitats as the desert horned lizard and a future survey within these habitats could result in a better understanding on protecting this species and its habitat.

The western banded gecko showed a possible correlation within the saltbush-salt cedar habitat and mixed riparian habitats during the 2003 survey. This study included two mature riparian sites close to the 2003 surveys sites that captured 16 but only one was captured during 2019. The western banded gecko is also a covered species under the CCMSHCP. A future study recommendation would be to focus on the different age riparian sites on both sides of the Wash within the Wetlands Park. Previous surveys have all been conducted on the north side of the Wash.

6.0 CONCLUSION

The western whiptail lizard was the most abundant species in all four years, followed by the side-blotched lizard. There have been no substantial changes in lizard richness along the Wash since 2001, despite dramatic changes in plant communities. Lizard populations have continued to thrive in the restored native plant communities.

Bradley and Niles (1973) documented 10 other snake species that were not encountered during the 2001–2003 and 2019 surveys. The lizards they inventoried were derived mainly through casual field observations, snake records were based on distributional data and generalized from collection records for the Las Vegas Valley. It is possible that some species on the Bradley and Niles list never actually occurred along the Wash.

A targeted nocturnal snake survey was recommended in the WMP, and the limited snake captures in the 2019 study support that recommendation. Just two species were captured in 2019 and only four species overall during the four years of surveys. The direct night searches were conducted in 2021 using an all-terrain vehicle with spotlights driving slowly along the trails within the Wetlands Park and will be reported on separately.

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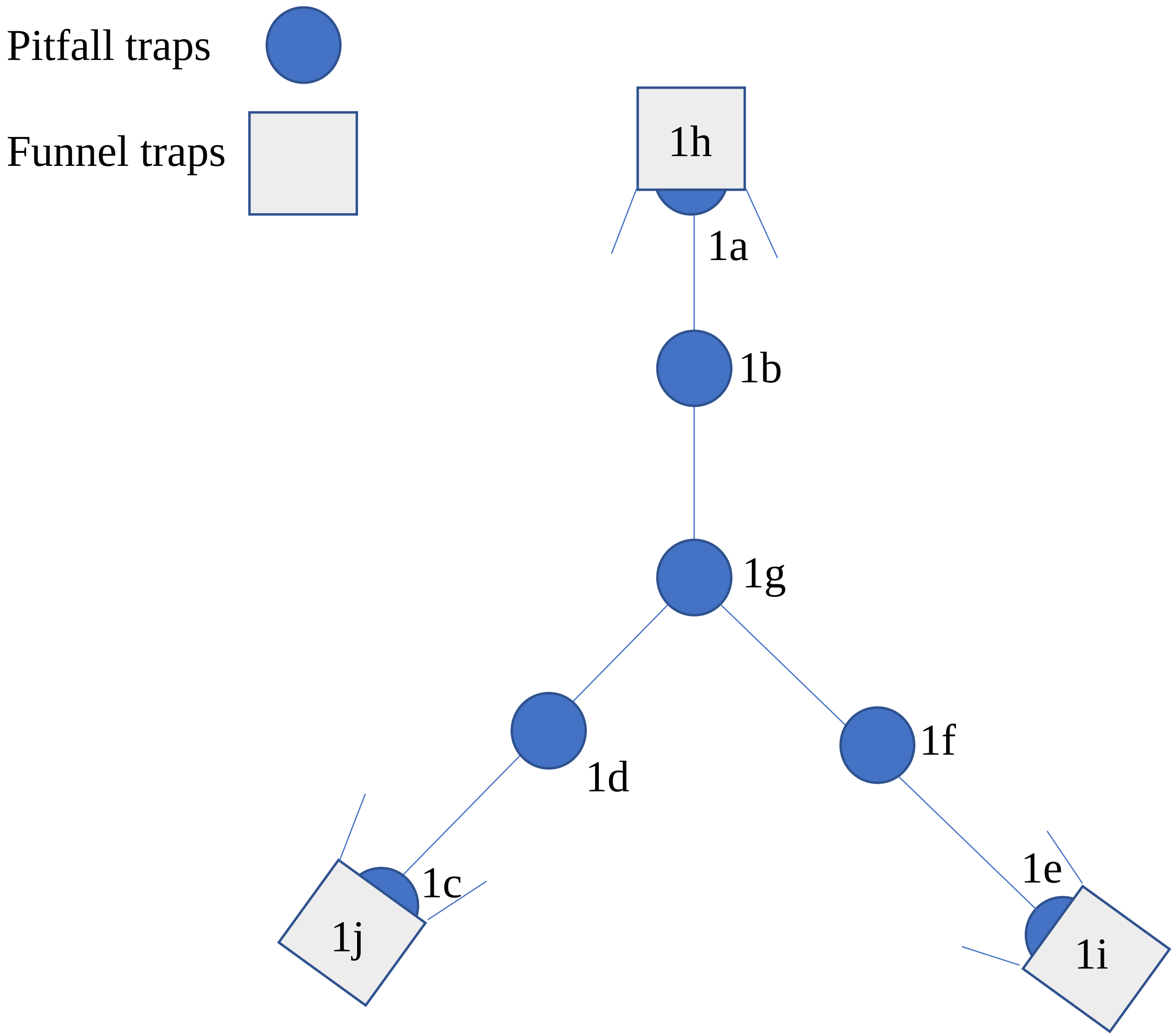
Appendix A

Array Design and Sites


Pitfall traps
Funnel traps
1h
1a
1b
1g
1d
1f
1c
1j
1e
1i

Array 1

Array 2

Array 3

Array 4

Array 5

Appendix B

Field Datasheet

Date:	**Monday Only** **Time 1st Trap Opened:** **Time Last Trap Opened:**	Weather conditions: rain clear overcast
Survey Day: Mon Tues Wed Thurs	**Thursday Only** **Time 1st Trap Closed:** **Time Last Trap Closed:**	Flowering plants observed: yes no
Field Personnel: **NR TR JM JE DS AA DV VW**	Beginning Temp at CH (F): Beginning Temp at GH (F): End Temp at CH (F): End Temp at GH (F):	

Trap ID	Time	Reptile Species	Recap? (Y/N)	SVL (mm)	TL (mm)	Mass (g)	Sex (M/F/U)	Age (J/A/N)	Regrown Tail? (Y/N)	Parasites (Y/N)	Non-target Species	Comments	

Western Whiptail Lizard (Aspidoscelis *tigris*)	ASTI	**Western Banded Gecko *(Coleonyx variegatus)***	COVA	**Desert Horned Lizard *(Phrynosoma platyrhinos)***	PHPL	**Desert Night Lizard (*Xanatusia vigilis*)**	XAVI	**Red Coachwhip *(Masticophis flagellum)***	MAFL
Side-Blotched Lizard *(Uta stansburiana)*	UTST	**Desert Iguana *(Dipsosaurus dorsalis)***	DIDO	**Long-Nosed Leopard Lizard (*Gambelia wislizenii*)**	GAWI	**Great Basin Gopher Snake (*Pituophis melanoleucus deserticola)***	PMDE	**Western Blind Snake (*Leptotyphlops humilis)***	LEHU
Yellow-backed Spiny Lizard *(Sceloporus uniformis)*	SCMA	**Zebra-Tailed Lizard *(Callisaurus draconoides)***	CADR	**Great Basin Collared Lizard (*Crotaphytus bicinctores*)**	CRBI	**Sidewinder (*Crotalus cerastes*)**	CRCE	**Common Kingsnake (*Lampropeltis getulus)***	LAGE

Appendix C

Photographs of Species

Western whiptail

Aspidoscelis tigris

Zebra-tailed lizard
Callisaurus draconoides

Western banded gecko

Coleonyx variegatus

Great basin collared lizard
Crotaphytus bicinctores

***Photographed but not captured**

Desert iguana
Dipsosaurus dorsalis

Common kingsnake
Lampropeltis getula

Red racer
Masticophis flagellum piceus

Yellow-backed spiny lizard
Sceloporus uniformis

Side-blotched lizard
Uta stansburiana

Yucca night lizard
Xantusia vigilis vigilis