



Las Vegas Wash Coordination Committee

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Large and Medium Sized Mammals of the Las Vegas Wash



August 2011



SOUTHERN NEVADA
WATER AUTHORITY



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**SOUTHERN NEVADA WATER AUTHORITY
Las Vegas Wash Project Coordination Team**

Prepared for:

**Research and Environmental Monitoring Study Team
Las Vegas Wash Coordination Committee**

Prepared by:

**Jason R. Eckberg & Marissa E. Foster
Southern Nevada Water Authority
100 City Parkway, Suite 700
Las Vegas, Nevada 89106**

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ABSTRACT

The Las Vegas Wash has undergone significant restoration efforts since the late 1990s. The Las Vegas Wash Coordination Committee's Wildlife Management Plan was developed to determine how this restoration impacts wildlife. To meet one of the recommendations of this plan, a study was conducted to inventory the large and medium sized mammals along the Las Vegas Wash. Six upland and six riparian areas along the Las Vegas Wash in Southern Nevada were surveyed for large and medium sized mammals using motion triggered camera traps. A total of 210 unique captures of the target group was achieved over 968 trap nights. Animals captured were comprised of five families and eight different genera, including three species which have not been documented in the area since the early 1970s; striped skunk (*Mephitis mephitis*), Western spotted skunk (*Spilogale gracilis*), and ring-tailed cat (*Bassariscus astutus*).

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1.0 INTRODUCTION

The Las Vegas Wash (Wash), formerly an ephemeral stream, is the primary conveyance for treated wastewater and stormwater from the Las Vegas Valley in Clark County, Nevada (LVWCC 2000). Increased flows beginning in the 1950s, from both wastewater and stormwater, resulted in creation of permanent wetland and riparian areas. Base flows and periodic, but occasionally substantial, stormwater flows increased through the 1980s, which contributed to extensive erosion of the channel resulting in a loss of wetlands and therefore wildlife habitat. The remaining habitat was dominated by the non-native salt cedar (*Tamarix ramosissima* Ledebour). In the late 1990s, the Las Vegas Wash Coordination Committee (LVWCC) was formed as a partnership between federal, state, and local agencies, businesses, environmental advocacy groups, and citizens to address environmental degradation along the Wash.

One of the goals of the LVWCC is to encourage the establishment, reestablishment, or protection of wildlife living at the Wash (LVWCC 2000). One method to accomplish this goal has been to remove salt cedar and revegetate these areas with native species. To date, over 265 acres have been revegetated along the Wash with the intent to create an ecosystem similar to other riverine systems in the Southwest United States (Eckberg 2011). However, the actual benefits of restoration projects similar to and including the Wash are unclear (Sogge et al. 2008).

Vegetation that passively established as a result of increased Wash flows allowed for the establishment of many wildlife species that would otherwise not be present including large and medium sized mammals (i.e. mammals averaging over one pound). Bradley and Niles (1973) described 13 large and medium sized mammals in the Wash vicinity in both wetland and upland habitats. No formal surveys have been done to determine how degradation of habitat and subsequent restoration programs have influenced the abundance and diversity of these species (Shanahan et al. 2008). Records since Bradley and Niles' (1973) baseline data have been acquired by direct observation of animals and their sign (scat, burrows, tracks, etc.; Shanahan et al. 2008).

Successful use of camera traps to inventory terrestrial mammals as well as perform presence-absence studies is well documented (Silveira et al. 2003, Trolle 2003, Srbek-Araujo and Chiarello 2005, Azlan and Lading 2006, Wemmer et al. 1996, and Tobler et al. 2008). We used camera trapping as a means to determine a current large and medium sized mammal species inventory and how it compares to inventories along the Wash prior to the environmental degradation and restoration efforts that have taken place over the past 40 years.

2.0 MATERIALS AND METHODS

This study was conducted in the Clark County Wetlands Park (CCWP) and at the Clark County Water Reclamation District (CCWRD) Wastewater Treatment Plant. After surveying the area, 12 sites were selected to represent riparian and upland habitats, with six sites selected of each habitat type. The sites were chosen because of noticeable animal sign and activity seen in the area. In order to determine seasonal animal activity, each site was surveyed for four weeks, once during each season (winter, spring, summer, and fall) beginning in November 2009 and concluding January 2011.

Sites chosen for study were located throughout the Las Vegas Wash (Figures 1 and 2). The most upstream site was at the CCWRD, north of the CCWP border, and the most downstream site was Rainbow Islands. In addition, sites were chosen on the north and south sides of the Wash channel. This was expected to play an important role as there is more human traffic on the south side with access restricted on the north. Upland sites included Site 108, Site 111, Tamarisk stockpile, and the Upstream, Midstream, and Downstream Desert Washes. The riparian sites were Pabco South, Calico Emergent, Cottonwood Cell, CCWRD, Rainbow Islands, and Bostick South.

Sites were monitored with a maximum of three Moultrie game cameras (Alabaster, AL). All deployed cameras were housed in Moultrie security boxes as a way to prevent damage or theft. The boxes were mounted to metal posts (Figure 1) in order to make them easier to move and set in different habitats. Cameras were approximately three feet above the ground, depending on site conditions. Each camera had a motion sensitive infrared sensor that allowed pictures and videos to be taken both day and night. Cameras were originally set to take three pictures consecutively once animal activity was detected. The cameras took 30 seconds to reset in between each picture. This usually resulted in the animal activity being missed. Cameras were changed to take videos recordings in addition to a single image after the first two months. Analysis of videos and photos included identification of individuals by looking for certain markings on muzzles, backs, and tails (Séquin et al. 2003 and Negroes et al. 2010).



Figure 1. Typical placement of cameras.

Coyote urine and cat food were used as lures to bring animals into the camera's photo range (Linhart and Knowlton, 1975). When the cameras were tripped, a video and an image were taken and recorded onto a memory card. These recordings were downloaded when the cameras were picked up. While cameras were positioned in the same site each season, the exact location within the site varied (Figure 2).

Pictures were analyzed for all animal activity patterns. Each species was identified and counted based on the date and time on the images (Azlan and Lading 2006). If animals were not able to be identified, they were not counted. Animals documented within 30 minutes of the original image were not counted as a new animal. Activity for all species was documented as crepuscular, diurnal, and nocturnal. Nocturnal activity was considered the night period 60 minutes after civil twilight began and 60 minutes before civil twilight ended. Diurnal activity was the daylight period beginning 60 minutes after civil twilight

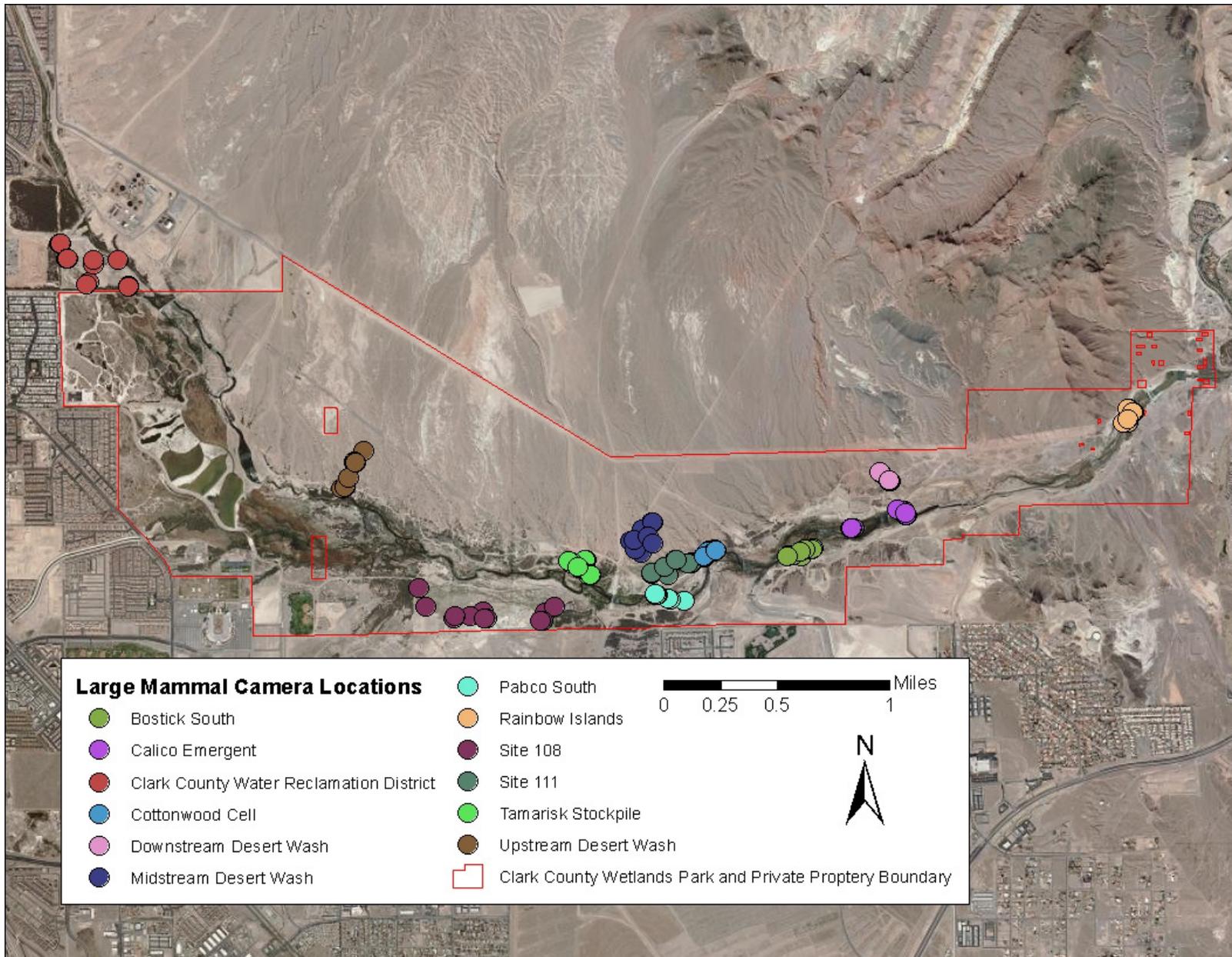


Figure 2. Large mammal camera locations along the Las Vegas Wash.

ended and 60 minutes before civil twilight began. Crepuscular activity occurs during the two two-hour spaces remaining in the evening as daylight ends and night begins and in the morning as daylight begins and night ends.

Absolute abundance was calculated at each site, for each species, and each season by taking the sum of individuals captured for the given timeframe. This was done for the entire length of the study. In addition, relative abundance index (RAI) was calculated for the study area as a whole, as well as for each sampled area for each species; that is,

$$RAI = \sum_j tn_j / \sum_j p_{ij}$$

where p_{ij} is the number of independent detections for the i th species at the j th trap location, and tn_j is the total trap-nights at the j th trap location (O'Brien et al. 2003, Kawanishi and Sunquist 2004, and Negrões et al. 2010). We scaled the data to captures per 100 trap nights.

3.0 RESULTS

Over the 64-week study (November 2009 to January 2011), a total of 968 trap nights collected data with eight target species being captured either with photographs or videos (Table 1). The camera trap locations covered an area of ca. 10.75 km². All sites captured at least one species, except for Downstream Desert Wash, which only captured non-target species. Species captured consisted of five families and all were in unique genera. The most prevalent captured species was coyote (*Canis latrans*) with 82 of the total 210 unique captures within the target animal group. Coyotes were captured at all times of day and night and were found at seven of the twelve study areas including five upland and two riparian areas (Figure 3).

Family	Scientific Name	Common Name	Captures	RAI
Canidae	<i>Canis latrans</i>	Coyote	82	8.47
Castoridae	<i>Castor canadensis</i>	American Beaver	6	0.62
Leporidae	<i>Lepus californicus</i>	Black-tailed jackrabbit	35	3.62
	<i>Sylvilagus audubonii</i>	Desert cottontail	64	6.61
Mephitidae	<i>Mephitis mephitis</i>	Striped skunk	1	0.10
	<i>Spilogale gracilis</i>	Western spotted skunk	6	0.62
Procyonidae	<i>Bassariscus astutus</i>	Ring-tailed cat	3	0.31
	<i>Procyon lotor</i>	Northern raccoon	13	1.34

Table 1. Large and medium sized mammals captured with camera traps along the Las Vegas Wash November 2009 to January 2011.

Riparian sites with access to water and vegetation canopies were dense. These sites had more captures than upland sites with 132 (63.5%). All eight target species captured during this study had at least one capture at a riparian site (Table 2). The most commonly photographed species within riparian areas was the coyote, with 55 captures. The site with the most unique captures was Cottonwood Cell, a riparian site dominated by cottonwoods (*Populus fremontii*), with 44 captures. This site also had the highest species richness for large and medium sized mammals (six of the eight species). The riparian site with the lowest abundance was Pabco South. This site activity was dominated by raccoons and beavers entering and exiting the water. This site is one of the most human trafficked, which likely resulted in such a low capture rate.

Species	Riparian Sites					
	Bostick South	Calico Emergent	CCWRD	Cottonwood Cell	Pabco South	Rainbow Islands
Coyote	4	-	27	-	-	25
American Beaver	-	3	-	1	2	-
Black-tailed jackrabbit	1	-	3	-	1	1
Desert cottontail	1	-	5	31	-	8
Striped skunk	-	-	-	1	-	-
Western spotted skunk	-	-	-	6	-	-
Ring-tailed cat	-	-	-	3	-	-
Northern raccoon	3	3	-	3	1	1

Table 2. Abundance of large and medium sized mammals at riparian sites along the Las Vegas Wash.



Figure 3. Still image of coyote taken at Site 111.

Upland sites that did not have close access to water and vegetation provided minimal cover, resulting in smaller abundance of captures than riparian sites. Four species were captured overall at the five upland sites with a total of 76 captures (Table 3). One upland site, Downstream Desert Wash, did not have any target species captured. The most commonly captured species at the upland sites was black-tailed jackrabbit (*Lepus californicus*), with 28 captures. The Upstream Desert Wash was the most abundant upland site. The second most abundant upland site was the Tamarisk Stockpile. As the name suggests, this area is dominated by salt cedar bordered on one side with a rock stockpile.

Species	Upland Sites				
	Midstream Desert Wash	Site 108	Site 111	Tamarisk Stockpile	Upstream Desert Wash
Coyote	9	7	-	3	10
Black-tailed jackrabbit	4	7	2	1	12
Desert cottontail	-	2	8	9	-
Northern raccoon	-	-	-	2	-

Table 3. Abundance of large and medium sized mammals at upland sites along the Las Vegas Wash.

Seasonal abundance of mammals (Table 4) indicates the highest level of activity taking place in the spring and fall seasons. Winter had slightly less activity than spring and fall. Summer had the lowest abundance, with the exception of the Northern raccoon. Four species were active throughout the year; coyote, black-tailed jackrabbit, desert cottontail, and Northern raccoon. The

American beaver was captured in all seasons except for summer and the remaining three species were limited and only captured in a single season.

Species	Fall	Winter	Spring	Summer
Coyote	38	16	23	5
American Beaver	1	1	4	-
Black-tailed jackrabbit	5	11	12	7
Desert cottontail	11	6	32	15
Striped skunk	1	-	-	-
Western spotted skunk	-	6	-	-
Ring-tailed cat	3	-	-	-
Northern raccoon	3	2	1	7

Table 4. Seasonal abundance of large and medium sized mammals along the Las Vegas Wash.

While the Cottonwood Cell had the highest species richness and highest number of captures, the site with the highest abundance (RAI) was the CCWRD (Table 3). Broken down by season, the site with the single highest RAI is Rainbow Islands. With the exception of Downstream Desert Wash, which had no captures of any target animals, the spring season had at least one capture in all sites. Like absolute abundance, the combined RAI for each season shows that spring had the highest abundance of target species followed by fall, winter, and then summer, which had the lowest abundance.

Site Name	RAI				Total
	Fall	Winter	Spring	Summer	
Bostick South	0.00	2.82	4.23	5.63	12.68
Calico Emergent	4.08	2.04	6.12	0.00	12.24
CCWRD	14.93	17.91	16.42	2.99	52.24
Cottonwood Cell	16.16	6.06	18.18	5.05	45.45
Downstream Desert Wash	0.00	0.00	0.00	0.00	0.00
Midstream Desert Wash	7.87	2.25	2.25	2.25	14.61
Pabco South	1.67	1.67	3.33	0.00	6.67
Rainbow Islands	30.67	4.00	6.67	5.33	46.67
Site 108	1.01	10.10	2.02	3.03	16.16
Site 111	0.00	0.00	8.33	0.93	9.26
Tamarisk Stockpile	1.14	4.55	2.27	9.09	17.05
Upstream Desert Wash	1.15	1.15	17.24	5.75	25.29

Table 5. Relative Abundance Index by site and season for large and medium sized mammals captured with camera traps along the Las Vegas Wash.

Nocturnal, diurnal, and crepuscular activity, as well as pattern, was calculated for the five species captured in more than one time period (Figure 5). Overall, the majority of activity was nocturnal with 113 (54.1%), followed by crepuscular activity with 54 (25.8%) captures and finally 42 diurnal captures made up 20.1% of the captures. All eight species had a minimum of one capture during nocturnal hours. Western spotted skunk (*Spilogale gracilis*; Figure 6), ring-tailed cat

(*Bassariscus astutus*), and striped skunk (*Mephitis mephitis*) were exclusively captured during nocturnal hours.



Figure 4. Still image of black-tailed jackrabbit from video taken at Upstream Desert Wash.

Captures included a total of 50 non-target species, with the majority being birds (n=32). Roadrunner (*Geococcyx californianus*) was the most common non-target species captured (n=18). Other non-target species captured include insects (n=2), lizards (n=1), bats (n=1), and ground-squirrels (n=5), with the remaining being unidentifiable animals.

Identification of individuals among species was not possible due to the quality of videos. Due to the low level of light, night pictures were of the lowest quality and night capture videos were created in black and white.

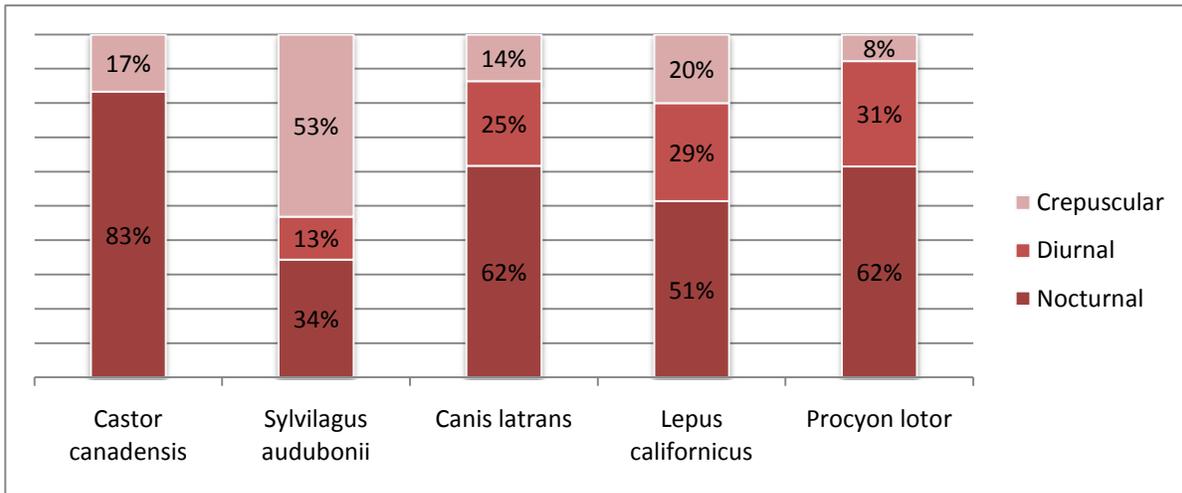


Figure 5. Percentage of nocturnal, diurnal, and crepuscular activity recorded for five selected species along the Las Vegas Wash from November 2009 to January 2011.

4.0 DISCUSSION

Camera trapping is the most cost and time efficient technique to retrieve a species inventory (Srbek-Araujo and Chiarello 2005). The addition of video recordings in this study allowed for the detection of more animals, as well as observation of animal behavior. This study marks the first detailed account of large and medium sized mammals active along the Wash. The only previous documented account of these species along the Wash was by Bradley and Niles (1973)

who used sign, scat, and undocumented reports as well as accounts of nearby areas to make their assessment.



Figure 6. Still image of Western spotted skunk from video taken at Cottonwood Cell.

The two most abundant sites, as well as the least abundant, were disturbed at some point during the study by natural or human caused disturbances. A strong flood at the CCWRD site knocked over vegetation and changed the topography of the site. The tamarisk trees that line the edge of the site along Monson Channel and along the west edge were unaffected, presumably retaining shelter to target species. Rainbow Islands (riparian site with the second highest abundance) had an earth mover disturb the soils and remove some vegetation. This changed the interior of the site but left many of the plants along the perimeter in place. The Downstream Desert Wash was disturbed in the middle of the study as it was located adjacent to the construction of Lower Narrows and Homestead Weirs. Vegetation was removed from the site to the Wash, resulting in this area becoming more remote, i.e. there was no longer a corridor from this site to the water within the Wash.

Weather was the main problem in acquiring good images of mammals during the study. The wind moved the vegetation and the cameras themselves causing multiple images to be taken, sometimes filling the memory card prior to the conclusion of the survey week. Rainfall also impacted the survey. To prevent equipment from being damaged or lost, cameras that were located in flood zones during storms were removed, and the survey period for that site was reduced.

With the exception of the CCWRD site, all locations were within the Clark County Wetlands Park, a public area that encourages visitors. While the hours are posted sunrise to sunset, there are limited barriers stopping people from entering the park at night. For areas known to have human traffic at night, cameras were often removed prior to the weekends to avoid theft. The camera locations were also chosen to avoid theft or damage; this may have resulted in lower quality locations for animal capture. In the final week of the study, two out of the three cameras were stolen from Bostick South.

The abundance of coyotes is similar to the combined abundance of lagomorph species, the desert cottontail and black-tailed jackrabbit. This is consistent with studies by Todd et al. (1981) and O'Donoghue et al. (1997) which documented that coyote population size followed patterns of their prey's population size. Lagomorphs would likely be the main prey of coyotes along the Wash (see Delibes et al. 1986 and Hernández and Delibes 1994) and their abundance would influence the health and dynamics of the coyote population. However, it should be noted that scat identified as coyote along the Wash by researchers tend to be predominantly filled with mesquite (*Prosopis* sp.) seeds with few animal parts identified. Additional research would be necessary to identify the actual diet of coyotes along the Wash.

The three least abundance species, Western spotted skunk, striped skunk, and ring-tailed cat were all found exclusively at the Cottonwood Cell site. There are no similar sites along the Wash as this 1.5 acre site has a dense cottonwood over story with very few other plant species (Eckberg 2011). The site is bordered to the south by rock riprap that is not immediately adjacent to any permanent water. This riprap may serve as a denning site to both skunk species (Zeiner et al. 1990) and shelter for the ring-tailed cat (Poglayen-Neuwall and Toweill 1988) which is known to nest in hollows of trees. These three species are also known to be potential prey of coyotes.

There were three species of large and medium sized mammals identified by the Las Vegas Wash Project Coordination Team (1999) to occur along the Wash that were not captured in this study; kit fox (*Vulpes macrotus*), bobcat (*Lynx rufus*) and desert bighorn sheep (*Ovis canadensis nelson*). An additional three species were identified by Bradley and Niles (1972) to occur or potentially occur along the Wash were not captured in this study and have not been documented along the Wash since the 1972 publication; gray fox (*Urocyon cinereoargenteus*), badger (*Taxidea taxus*), and muskrat (*Ondatra zibethica*). It is unclear why these species are no longer present or in high enough abundance to be captured in this study. Potential reasons include increased human activity in the area since 1999, removal of habitat (salt cedar), and relative immaturity of revegetation areas. Exact reasons are likely to be species specific. If information is desired regarding specific species, targeted studies would need to be done.

It is recommended that large scale camera trapping be done again in five years to evaluate ongoing restoration activities and their impact on wildlife habitat as described in the Las Vegas Wash Wildlife Management Plan (Shanahan et al. 2008).

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