



# Monitoring of Leptien's spiny-tailed lizard (*Uromastyx aegyptia leptieni*) inside the Dubai Desert Conservation Reserve, UAE.



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#### Abstract

The Dubai Desert Conservation Reserve (DDCR) is the UAE's first National Park established by government decree in 2003. It constitutes 4.7% of Dubai's total land mass and harbours nearly 400 species of native flora and fauna. These include Leptien's spiny-tailed lizard (*Uromastyx aegyptia leptieni*), an endangered reptile endemic to the Arabian Peninsula. The current study aims to determine the population size, distribution, density and movement patterns of Leptien's spiny-tailed lizard inside the gravel plain habitats of the DDCR. Line transects were used to locate burrows in all known gravel plain habitats within the reserve. The survey recorded a total of 598 spiny-tailed lizard burrows with 424 new records, 362 active, 125 inactive, and 111 abandoned burrows. Al Maha and the Gravel Plain Research areas held the highest densities of spiny-tailed lizard burrows. This year marked a record in spiny-tailed lizard burrows accompanied by colonization of new territories, indicating an overall population growth. Results also highlighted the need to both update existing spiny-tailed lizard habitat data and expand the survey into previously unexplored areas of the reserve to gain a better understanding of the species' dispersal strategies.





#### Introduction

The Dubai Desert Conservation Reserve (DDCR) stands as the UAE's inaugural National Park, established by government decree in 2003, encompassing 225 km<sup>2</sup>, constituting 4.7% of Dubai's total land mass. Its primary objective is to preserve a representative sample of Dubai's original inland desert landscape, alongside the indigenous fauna and flora of the region. The DDCR boasts a diverse ecosystem, harbouring nearly 400 species of native flora and fauna, including the Leptien's spiny-tailed lizard (*Uromastyx aegyptia leptieni*) (DDCR, 2023).

Leptien's spiny-tailed lizard is a sizable, herbivorous species endemic to the United Arab Emirates and Oman. It thrives in habitats such as gravel plains, interdunal plains and wadi beds (Wilms & Bohme, 2018). While the species *Uromastyx aegyptia* has been categorized worldwide as Vulnerable by the International Union for Conservation of Nature (IUCN) (Wilms, et al., 2012), the subspecies *U. aegyptia leptieni* has not undergone evaluation. At a national level, this subspecies of spiny-tailed lizard is also classified as vulnerable due to habitat loss, as per the most recent assessment conducted in 2018 (Wilms & Bohme, 2018) (Allen, et al., 2021)

Spiny-tailed lizards typically reside in loose colonies and feed on low vegetation near their burrows, predominantly situated on gravel plains (Wilms & Bohme, 2018). Research on this species within the DDCR commenced in 2009 with a foundational study aimed at assessing population size, distribution and density (Simkins & Ingram, 2009). Subsequently, this study has been periodically reiterated over the past 14 years at intervals of 1–3-years (Roy, 2018). The current study seeks to uphold this ongoing investigation into the population size, distribution, density, and movement patterns of Leptien's spiny-tailed lizards within the gravel plain habitats of the DDCR, as part of the species' conservation program.

## Objectives

To determine a rough population count, distribution, density and to study the movements of Leptien's spinytailed lizard (*Uromastyx aegyptia leptieni*) in the gravel plain habitats of the DDCR.

#### Methods

The survey was conducted from June to September of 2023 as it's the warmest part of the year, facilitating the sighting of Spiny-tailed lizards as they come out to forage (Roy, 2018). All gravel plains in the reserve were searched using line transects, in which the team would spread out to form parallel lines approximately 10-20m away from each other. Team members would then walk in a straight line using a GPS (Garmin Montana 600) loaded with 2020 data to locate pre-existing burrows and record any new ones encountered. All gravel plains within the DDCR were "combed" in this manner to search for Spiny-tailed lizard burrows (Figure 1).

The DDCR research team visited all the burrows that had been recorded as either "active" or "inactive" during the 2020 monitoring survey. Printed Excel sheets were used alongside GPSs to record data in the field (Figure 2). Data recorded included: the researcher's name, date, waypoint name, coordinates, elevation (m), new/previous burrow, 2020 results, 2023 results, opening direction, opening size (cm), surrounding vegetation, other animal tracks, and comments. Every time a new burrow was located a waypoint was created





on that team member's GPS and survey data from all GPSs was downloaded onto the office's computer regularly. Obtained data was then compared to previous years to obtain a population and movement estimation of the Spiny-tailed lizard inside the DDCR.



Figure 1. Location of gravel plains inside the DDCR.

Waypoint Name	Date	x	Y	Elevation (masl)	2020 Results	2023 Results	Opening Direction	Opening Size (W x H) (cm)	Vegetation around	Other animal tracks around	Comment
									Fagonia indica,		
STL23001	05/07/2023	55.60898	24.89018	165		Active	95E	9x4	Plantago ciliata	Birds	small tracks
STL - 111	26/08/2023	55.68507	24.82573	216	Active	Abandoned					
									Arnebia hispidissima,		
									Fagonia indica,		
STL23002	05/07/2023	55.60261	24.88570	164		Active	275W	12x6	Stipagrostis plumosa		Tail marks
									Fagonia indica, Arnebia		
STL23003	05/07/2023	55.60284	24.88505	163		Active	105E	9x3	hispidissima		Feet and tail marks
											Lots of dung around.
									Fagonia indica, Arnebia		Entrance covered by plants-
STL23004	06/07/2023	55.60175	24.88525	171		Active	309NW	20x4	hispidissima	Insects	dry plants
									Arnebia hispidissima,		
									Fagonia indica,		
STL23005	06/07/2023	55.60173	24.88554	175		Active	212SW	32x12	Stipagrostis plumosa	Ants inside burrow	Tracks and feces around
									Fagonia indica, Arnebia		
STL23006	06/07/2023	55.60195	24.88487	169		Active	316NW	12x3	hispidissima	Insects, geckos	Tracks and dung present

Figure2. Excel datasheets.

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## Results

The team found a total of 598 Spiny-tailed lizard burrows, of which 424 were new records. A total of 362 burrows were active, 125 were inactive and 111 were abandoned. These are record numbers when compared to previous years' surveys (Figure 3). The number of new burrows found has also increased from 162 in 2020's survey to 424 in 2023 (Figure 4). Spiny-tailed lizard burrows were found to concentrate not only in large gravel plains, increasing the number of burrows in pre-established areas, but also in more remote areas populating new gravel plains (Figure 5).



Figure 3. Number and classification of spiny-tailed lizard burrows 2018-2023.



Figure 4. Number of new spiny-tailed lizard burrows found 2018-2023.



Figure 5. Distribution of active and inactive burrows across the DDCR for 2020 (left) and 2023 (right).

#### Discussion

This year's survey resulted in a record number of burrows surveyed compared to previous years and represents a significant increase compared to the survey done in 2020. This may be due to more favourable vegetation conditions as the 2022-2023 winter period was a particularly wet one, with precipitations that favoured vegetation growth (Figure 6) (Dubai Municipality, 2022; Dubai Municipality, 2023). The highest densities of spiny-tailed lizard burrows were found in large gravel plains located at Al Maha and the Gravel Plain Research Area (Figure 7). Al Maha gravel plains also held the bulk of abandoned burrows recorded (Figure 8), suggesting population fluctuation in the area. Spiny-tailed lizards are known to use several burrows and have little issue sharing their burrows with other individuals of their own or another species. It has been recorded from studies done on U. aegyptia microlepis in Saudi Arabia that spiny-tailed lizard burrows play an important role as refuges for a variety of desert species (Wilms, Wagner, Shobrak, Lutzmann, & Böhme, 2010). This was observed on numerous occasions during the 2023 survey, as burrow entrances would often contain insect and bird tracks. Additionally, geckos, scorpions, horned vipers, and even monitor lizards were found using Spiny-tailed lizard burrows, though whether the spiny-tailed was present inside as well at the time is unknown (Annex 2). These findings could indicate that, while a surplus of burrows is likely, a large number of both abandoned and new burrows in the same area points to shifts in the overall population as unused burrows can quickly become blocked and disappear from one year to the next (Basil Roy and Pubudu Madurapperuma, internal discussion).







Figure 6. Average annual precipitation (mm) in the area from 2021 to 2023.



Figure 7. Spiny-tailed lizard burrow density in the DDCR.







Figure 8. Location of burrows classified as active, inactive, and abandoned in the central part of the reserve.

The most notable change, however, was the colonization of gravel plains in remote and isolated areas, such as those found near AI Faqah waterhole and close to the fence line in the south and east of the reserve. Additionally, there are several new colonies, such as the one found to the south of Manana Lake, which had not been present in previous years (Figure 9). These results likely derive from a slight addition to the methodology that was absent in former surveys. Previously, in 2018 and 2020, only the gravel plains with reported spiny-tailed burrows were surveyed, whereas this year all gravel plains were included in the survey, regardless of whether previous records of burrows existed in the area.







Figure 9. Location of new colonies in the south and east of the reserve as well as Manana Lake.

During the survey, it was also noted that many gravel plains are not integrated into the DDCR's geodatabase, as can be seen in several of the maps throughout this report in the form of seemingly isolated points (Figures 5-9). The DDCR's geographic database was started approximately 20 years ago by the previous Conservation Manager, Greg Simkins, and much of the data concerning habitat types is over 15 years old. Such is the case for the ESRI shapefile containing the georeferenced data for gravel plains inside the reserve. It is, therefore, necessary to update our geographic database to include up-to-date habitat types and their distribution in the reserve. This is especially important due to the development of the DEWA ASR project by the Dubai Electricity & Water Authority inside the DDCR that kicked off during the first quarter of 2023. As a result, a total of 4 gravel plains will be lost, one of which contains active burrows, and an additional 5 gravel plains will be impacted (Figure 11). This will affect both habitat availability and Spiny-tailed lizard burrow distribution in future surveys.







Figure 11. Location of gravel plains inside DEWA ASR project boundary.

## Conclusion

We anticipate that as vegetation conditions continue to improve in the reserve through effective management and conservation practices, the population and density of spiny-tailed lizards will correspondingly increase. This year has marked a record in spiny-tailed lizard burrows, indicating an overall population growth in the reserve. Moreover, previously unoccupied areas are now being colonized, demonstrating dispersal into new territories. Dispersal strategies for this species remain unknown, and results from this survey have highlighted the necessity to both update our existing data on spiny-tailed lizard habitat and expand the survey into previously unexplored areas of the reserve. This endeavor will enable us to gain a deeper understanding of how this species establishes itself in remote and seemingly isolated territories. The impact of the DEWA project on the spiny-tailed lizard population should also be carefully monitored to document how these reptiles respond to habitat disturbance and degradation.





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# APPENDICES Annex 1 – Field survey photographs



Conservation Officer Basil Roy with volunteering Al Maha Field Guide Carl Swartz recording data from a newly discovered burrow.



Conservation Officer Basil Roy with volunteering Al Maha Field Guide Shaun Van Altena recording data from a burrow discovered in previous years.







Conservation Officer Maria spotting a spiny-tailed lizard (red circle) outside its burrow.



Conservation Ranger Pubudu gathering data on a newly discovered burrow.





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# Annex 2 – Species found using spiny-tailed lizard burrows.



Desert monitor (Varanus griseus) poking its head out of a spiny-tailed burrow.



Arabian horned viper (*Cerastes gasperettii*) buried at the entrance of a burrow.







Baluch rock gecko (*Bunopus tuberculatus*) that fled into the burrow when startled, despite the horned viper at the entrance.



Gecko (Gekkonidae) found inside a burrow through experimental use of an endoscope camera.