Annual gazelle count in the Dubai Desert Conservation Reserve (DDCR) - 2024

October 9th, 2024

Survey Team:

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Collaborating:

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Abstract

The Dubai Desert Conservation Reserve (24.857092° N, 55.675099° E) is one of the oldest reserves established in the UAE. With an area of 225 km2, the reserve hosts several species indigenous to the hyper-arid desert ecosystem. This survey aimed to collect species count and ecological data for the two gazelle species present in the reserve namely the Sand Gazelle (*Gazella marica*) and the Arabian Gazelle (*Gazella arabica*). A total of 684 Arabian gazelles were recorded, which were mostly concentrated in the gravel plains located around Al Maha Resort, and around waterholes as well. A total of 181 Sand gazelles were counted and they were mainly found in isolated areas in the south of the reserve where the presence of humans is lower. The number of females was higher in both species and their social structures were very similar. There has been an increase in the number of individuals compared to results from the last survey done in 2023 (DDCR, 2023). This could be due to the bigger effort during this survey, with more teams and more participants involved in the counting.

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Introduction

The Dubai Desert Conservation Reserve (DDCR) is the UAE's first National Park and was established by government decree in 2003. It encompasses 225 km^2 and represents 4.7% of Dubai's total land mass. Its main purpose is to preserve a representative sample of Dubai's original inland desert landscape along with indigenous flora and fauna of the region. The DDCR is home to a diverse ecosystem, harbouring hundreds of desert species including three ungulate species: the Arabian oryx (*Oryx leucoryx*), Arabian gazelle (*Gazella arabica*) and sand gazelle (*Gazella marica*) (DDCR, 2023).

The Arabian gazelle is a small and slender species, weighing 12 – 16 kg, with a fawn to brown coloured coat on the back, head and neck, white underparts, and two white face stripes extending from eyes to nostrils. Their wild population was estimated at 5000 – 7000 matured individuals in 2016 during their latest assessment by the International Union for the Conservation of Nature (IUCN), which classifies this species as Vulnerable (IUCN SSC Antelope Specialist Group, Arabian Gazelle, Gazella arabica, 2023). The sand gazelle is the second largest ungulate in the UAE, weighing 15 – 25 kg, with light brown/sandy upperparts and white face and underparts. Their wild population was estimated at 1750 – 2150 mature individuals by during their latest assessment in 2016. Like the Arabian gazelles, they are also considered Vulnerable by the IUCN (IUCN SSC Antelope Specialist Group, 2017)

Both gazelle species have suffered considerable population decline and disappeared from many parts of their historical range due to hunting, illegal capture, habitat degradation and fragmentation, and, more recently, due to competition for food with domestic livestock. Conservation for both of these species began in the UAE in 1999 with their reintroduction into the Al Maha Reserve (currently DDCR) and continues to this day through conservation programs and protected areas across the UAE (Javed, Garcia-Rawlins, Rodriguez, Sakkir, & Dhaheri, 2020; DDCR, 2023; IUCN SSC Antelope Specialist Group, 2023; Shalmon, Sun, & Wronski, 2020; Cunningham & Wacher, 2009).

As part of DDCR's monitoring program for Major Site Values (MSV), DDCR team performs weekly game counts across the reserve through all the main roads, focussing on feeding spots, to assess the ungulate population within the reserve. However, as these counts are only performed along the main roads large sections of the reserve remain unsampled. Additionally, feeding spots are dominated by oryx, which could be creating a bias and lead to inaccurate data for the gazelle species. Therefore, a survey focused on Arabian and sand gazelles is necessary to accurately estimate these species' populations inside the reserve. The current survey aims to estimate the population of Arabian and sand gazelles living inside the DDCR, study aspects of their biology and ecology, and provide yearly data to compare and help provide management solutions.

Although the survey is focused mainly on gazelles, other species part of our MSV are included in the survey as their presence is rare in the UAE. Additional species included are the Asian houbara (*Chlamidotis macqueenii*), pharaoh eagle-owl (*Bubo ascalaphus*), and lappet-faced vulture (*Torgos tracheliotos*).

Methodology

The survey was conducted on October 9th, 2024, from 6:00 AM to 10:30 AM with a total of 17 participants. The reserve was divided into six distinct areas: Margham, North, Al Maha, Central, South, and Fenceline (Figure 1). The surveyed areas remained consistent with those of previous surveys (Jaradat, et al., 2021) (DDCR, 2023), although they were grouped differently for this survey (Table 1).

Participants were organized into six teams, each consisting of 2–3 individuals. Each team was assigned a specific survey area and provided with a 4x4 vehicle, which was driven at speeds ranging from 10 to 30 km/h throughout the duration of the survey.

Training on species identification and gendering for all target species was carried out by Maria, DDCR Conservation Officer, 30 minutes prior to starting. The survey used a mix of vehicle transects and ground count methods. Main roads and tracks were used to cover the entire reserve, and all areas were counted simultaneously to avoid double-counting as much as possible. Four irrigated zones were included in the survey, namely Tawi Hussein, Tawi Ruwayyan, Tawi Manana, and Tawi al Fawi in the Margham, North, Central and South areas respectively. Each team carried one GPS device, binoculars and a camera. Photos were taken of especially large groups to verify numbers and gender classification. Collected data included: species, gender, age group, number of individuals in each age group by gender, location, GPS coordinates of each sighting and kilometres driven (Figure 2). Juveniles were not gendered and individuals that could not be grouped under gender or age were recorded as "unidentified".

No.	Survey Team	No. Members	Area	Track colour in map	Total km driven
1	Gerhard, Emily, Ellie	3	Central	Green	45
2	Basil, Hakima Anna	3	Al Maha	Pink	51
3	Pubudu, Austin, Marwan	3	Margham	Blue	31
4	Pete, Hugo, Yeni SS	3	South	Purple	80
5	Rashid Jr., Naseer	2	Fence	Black	87
6	Maria, Joanna, Norbert	3	North	Orange	61

Table 1 *Team effort during survey*

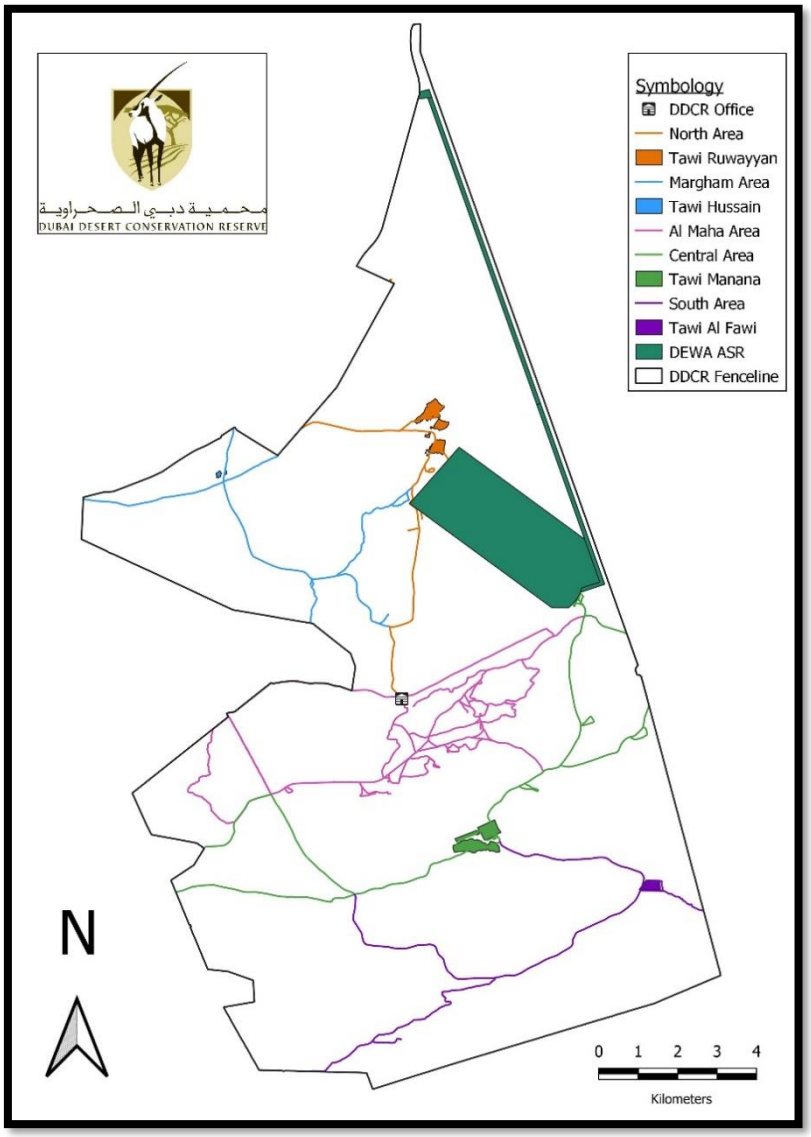


Figure 1 *Map of surveyed areas*

DATASHEET: GAZELLE COUNT SURVEY

TEAM NAME:					
Team members				Date (DD/MM/YY)	
Vehicle KM Start		Vehicle KM Finish		Total Distance KM	Time
Total Area Covered					

Sighting No.	Species name (Select)					Total number of: Males (M), Females (F), Juveniles (J)						Location	GPS Coordinates (N, E)	Comments
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				
	Arabian Gazelle	Sand Gazelle	Houbara	Vulture	Pharaoh Eagle-owl	M		F		J				

Figure 2 *Data sheet used for the gazelle count survey*

Results & Discussion

A total of 684 Arabian gazelles (220 males, 330 females, 131 juveniles and 3 individuals of unidentified sex) were recorded. The total count for sand gazelles was 181, with 65 males, 81 females and 35 juveniles. Four foxes and 1 pharaoh eagle-owl were also recorded during the survey. In addition, two species part of the MSV were sighted, specifically 4 individuals of Arabian red fox and 1 Pharaoh Eagle-owl (table 2).

SPECIES	TOTAL	Males	Females	Juveniles	Unidentified
Arabian Gazelle	684	220	330	131	3
Sand Gazelle	181	65	81	35	0
Arabian Red Fox	4	0	0	0	4
Pharaoh Eagle-owl	1	0	0	0	1

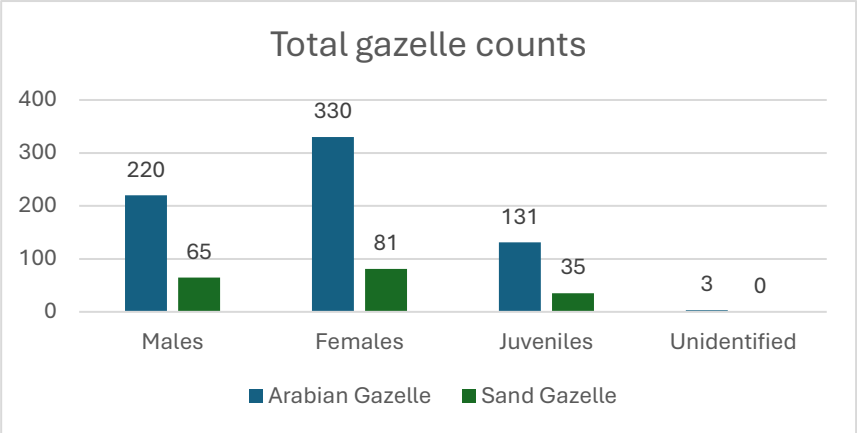
Table 2 *Gazelle count survey results.*

➢ *Abundance of gazelle species*

The Arabian gazelle was the most abundant species recorded, with a dramatic increase in numbers since last year's survey, rising from 421 to 684 individuals. This represents a 162.5% increase in the Arabian gazelle population within the reserve. A study on the reproductive biology of Arabian gazelles conducted at the King Khalid Wildlife Research Centre reported an annual birth rate of approximately 33 calves (Martin, Riesch, Plath, Al Hanoosh, & Wronski, 2023). Although this study was conducted in a controlled environment with captive animals housed in separate pens, the findings serve as an estimate to help assess the population growth rate at DDCR. These results are consistent with those obtained in the 2021 survey (Jaradat, et al., 2021). The lower count from last year may be attributed to a reduced number of survey teams. This year, survey efforts were expanded with additional teams and personnel, resulting in more areas being covered in less time and more participants collecting data.

Regarding the sand gazelle, there has also been an increase in population compared to last year. The current population count stands at 181 individuals, compared to 101 recorded in the previous survey (DDCR, 2023). This is double than the weekly count made by DDCR team (97 individuals).

As mentioned before, DDCR staff does weekly counts for ungulates on the main roads close to the feeding stations. The count for that same day from the staff was 363 Arabian gazelles and 97 sand gazelles. This difference is because they do not count in all areas of the reserve but in those roads close to the feeding stations.



➢ *Social structure*

To gain a deeper understanding of the dynamics and behaviour of these gazelle species, their social structures were analysed. 94% of the Arabian Gazelles were in groups, while only 6% were recorded alone (Figure 3 left). This is consistent with the results obtained in 2023 although the total is much higher. The highest number of lonely individuals are males, followed by females, and lastly some juveniles. Some of the locations between the solitary females and the calves/juveniles were close. Females leaving the youngest covered or resting could be a reason for this presence of lonely females and juveniles. In the case of the Sand Gazelle, the results were similar to the Arabian Gazelle with only an 8% of the individuals being solitary, although most of them males (75%) (Figure 3 right). For both cases, this can be interpreted as gazelles being social animals rather than rare solitary individuals. This aligns with the results recorded in 2023.

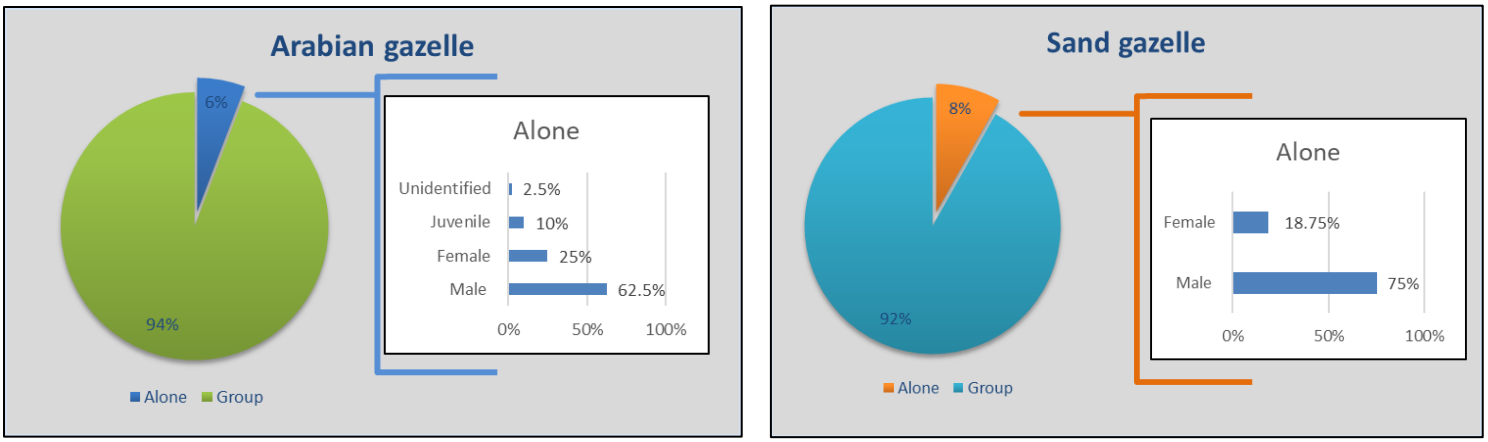
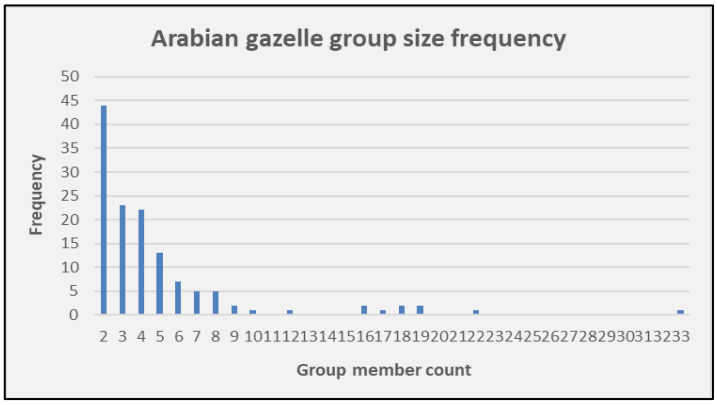


***Figure 3 Left**: Arabian gazelle social structure. **Right**: Sand gazelle social structure.*

➢ *Gazelle Frequency*

Upon further analysis of the populations, we can infer their dynamics within the DDCR. As previously noted, both species of gazelles are social animals. For the Arabian Gazelle, in particular, while solitary individuals are occasionally observed, there is a clear preference for small groups, typically consisting of two individuals. The frequency of sightings decreases as group size increases (Figure 4, left). Most of the observed pairs were female-calf groups, followed by female-male pairs. As expected, no pairings of males with calves or juveniles were recorded (Figure 4, right). These findings are consistent with the results obtained in 2023 (DDCR, 2023).



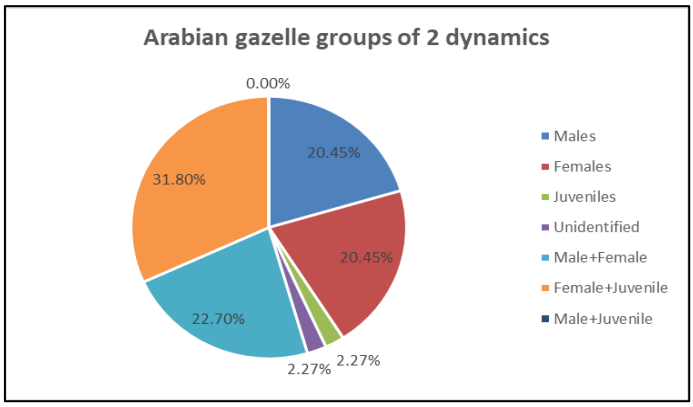
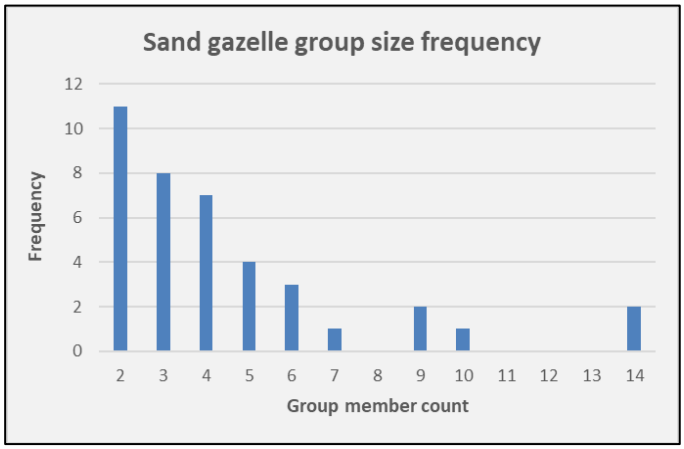


Figure 4 Left *Arabian gazelle frequency.* ***Right:*** *Arabian gazelle group dynamic*

For Sand Gazelles, this year's results differ from those observed in 2023. The most recorded group size consists of two individuals (Figure 5, left), with males comprising 45.5% of these pairs (Figure 5, right). Notably, one pair was observed to include a male and a calf/juvenile. It is important to consider that this species is particularly elusive, with a preference for deep sand dune habitats, which makes them more difficult to spot—especially under favourable weather conditions.



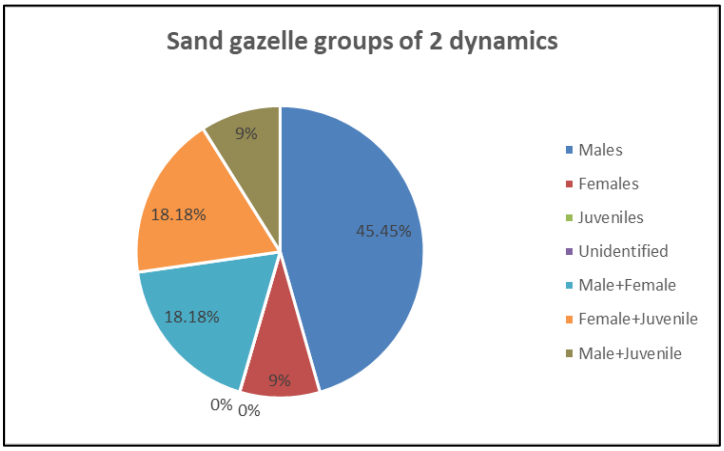


Figure 5 Left *Sand gazelle frequency.* ***Right****: Sand gazelle group dynamic*

➢ *Gazelle Distribution*

Arabian Gazelles were primarily observed in the dunes and gravel plains surrounding the Al Maha Resort and the DDCR office (Figure 6). While some records were made in the southern parts of the reserve, most sightings were concentrated in the northern regions, particularly in areas with Ghaf groves. Compared to the previous surveys conducted in 2021 and 2023 (Jaradat, et al., 2021) (DDCR, 2023), Arabian Gazelles now appear to be more concentrated in specific areas of the reserve, rather than being widely dispersed. This year, the ongoing DEWA construction project was expected to result in an absence of gazelle sightings in that area.

Sand gazelles were primarily observed in the southern regions of the reserve (Figure 7), which aligns with the DDCR's weekly observations and their typically elusive behaviour, as they prefer more isolated areas. The southern part of the DDCR also experiences lower human activity compared to other areas. This finding contrasts with last year's data, which showed the gazelles more dispersed, with a higher concentration in the northern part of the reserve, particularly around a shaded area.

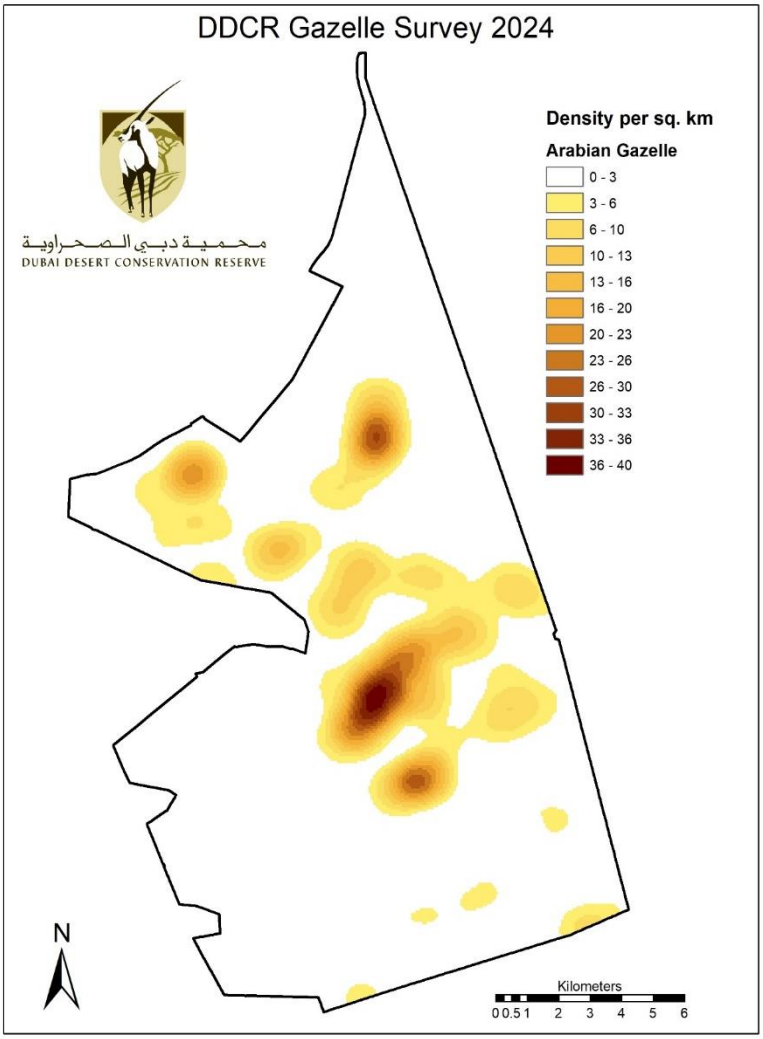


Figure 6 *Arabian Gazelle distribution in the DDCR*

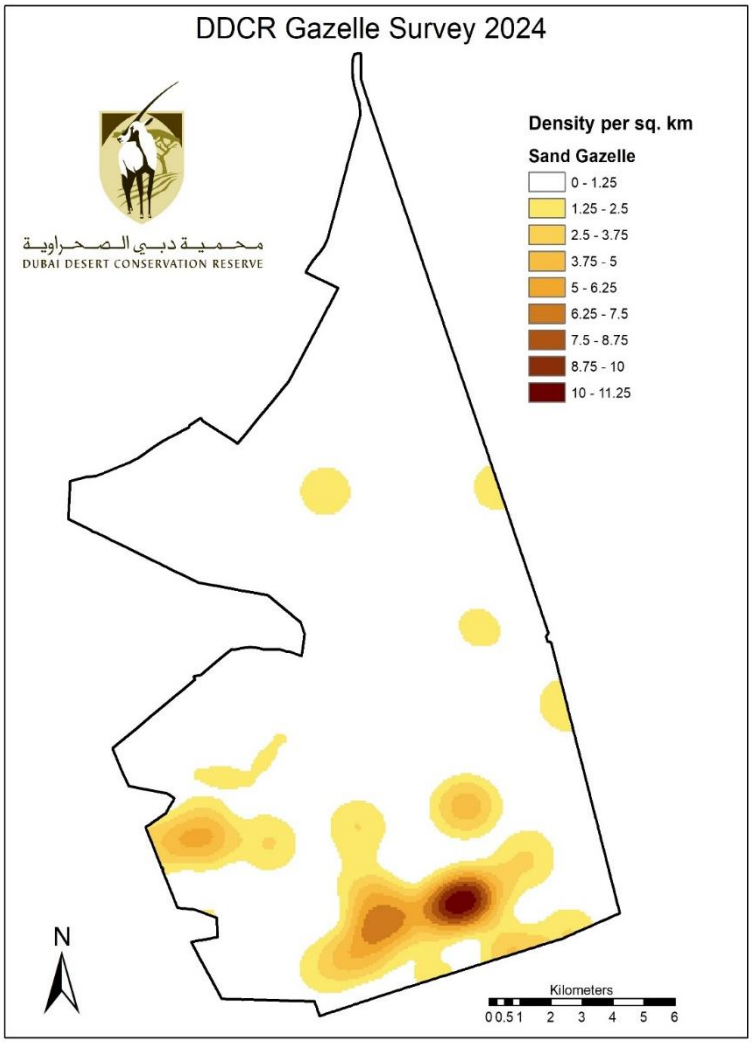


Figure 7 *Sand Gazelle distribution in the DDCR*

➢ *Other encounters*

The target species for observation included the Asian Houbara, any species of vulture (with a focus on the more frequently encountered Lappet-faced Vulture), and the Pharaoh Eagle-owl. Only one Pharaoh Eagle-owl was recorded in the Al Maha area (Figure 8 left), near the site where another was spotted last year. No other MSV species were recorded. However, a total of four Arabian Red Foxes were observed, two of which were in the Al Maha area (Figure 8 right).

There have been no releases of Asian Houbaras in the reserve over the past two years, and the only sighting this year occurred in January, so their absence was expected. Vultures are regularly recorded in the reserve through the camera trap program, typically appearing closer to midday.

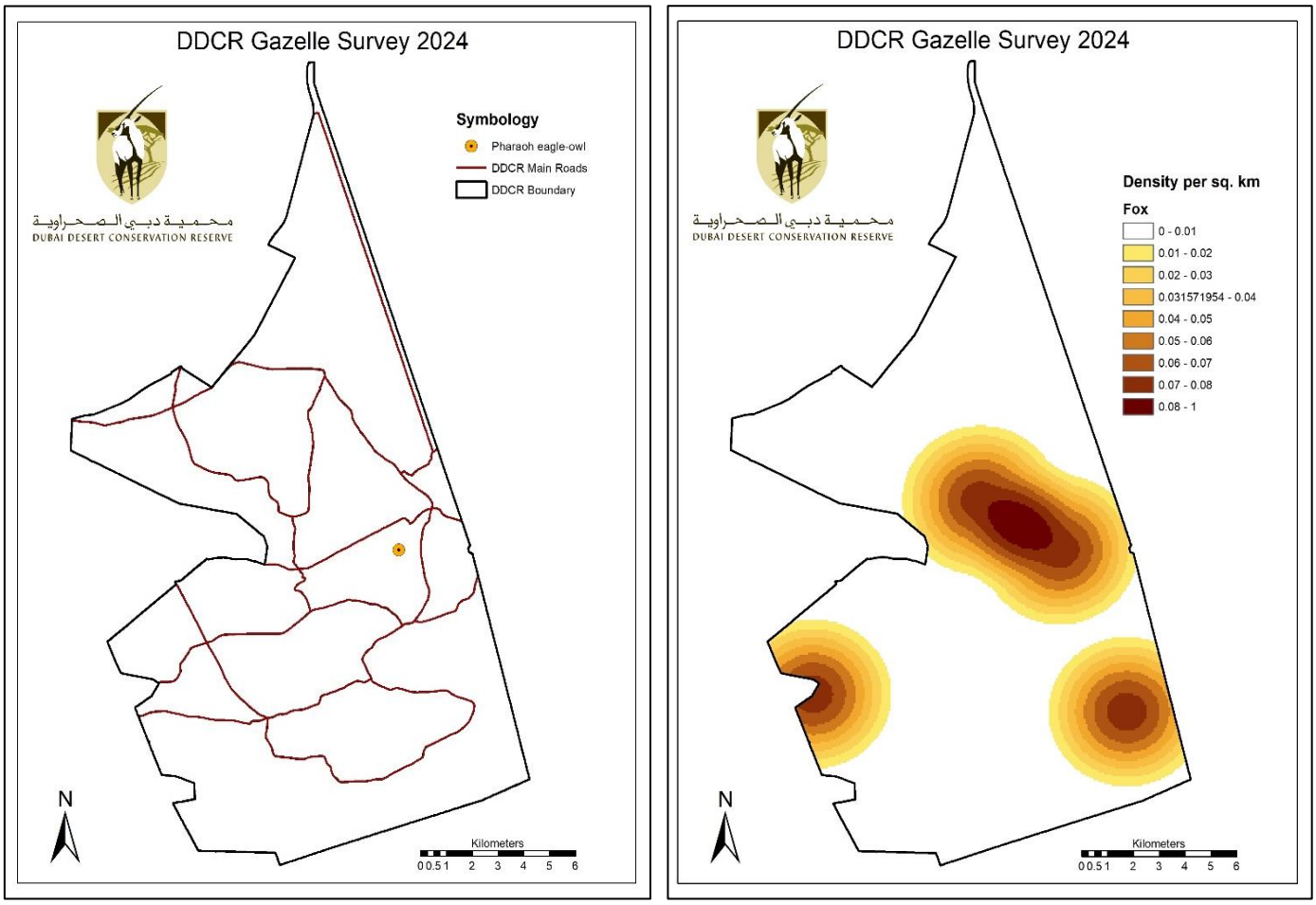


***Figure 8 Left**: Pharaoh Eagle-owl sightings in DDCR **Right**: Arabian Red Fox density in the DDCR*

Conclusion

The gazelle surveys conducted this year and last were carried out in the same month to allow for a better comparison of results. This year, the survey effort was increased by involving more teams and personnel, who were briefed on gazelle identification prior to the survey and received additional training on the morning of the survey. As a result, the number of records nearly doubled compared to last year. The higher number of records from this annual survey, in comparison to the weekly surveys, underscores the importance of this broader survey, as it covers a larger area of the reserve (though still limited to areas with roads).

To enhance the survey, it is suggested that it be conducted bi-annually to track trends across different seasons. Additionally, conducting a survey in more isolated areas, beyond those accessible by road, would help capture a more comprehensive picture. Furthermore, there is a lack of studies on the genetic diversity of the gazelles within the DDCR. Research into this aspect could significantly contribute to the scientific understanding of these species.

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