Bi-annual gazelle Survey in the Dubai Desert Conservation Reserve (DDCR) – March 2026

March 25th, 2026

Survey Team:

Maria Jose Martin, Aline Witte de la Torre, Basil Roy, Gerhard Erasmus, Felix Wanniarachchige, Khaseem Ali Mohammed, Muhammed Rafiq, Muhammad Rashid, Suhaib Vayakkarth, Mohammed Alumkandi.

Collaborating:

Caleb Rowberry, Anaïs Steenkamp, Dounia Lamtali, Norbert Csuzda, Janka Szabo.

ABSTRACT

The Dubai Desert Conservation Reserve (24.857092° N, 55.675099° E) is one of the first protected areas established in the United Arab Emirates. Covering approximately 225 km², it provides habitat for a wide range of species adapted to the region's hyper-arid conditions. This survey aimed to assess the population status and ecological characteristics of the two gazelle species present in the reserve: the sand gazelle (*Gazella marica*) and the Arabian gazelle (*Gazella arabica*).

The March 2026 gazelle survey recorded 755 Arabian gazelles and 164 sand gazelles within the DDCR. Arabian gazelles remain the dominant species and show a continued increase in numbers, while sand gazelle populations appear stable. Both species displayed predominantly social behaviour consistent with the spring aggregation period, with small group sizes being most common.

Arabian gazelles were widely distributed across the reserve, particularly in vegetated and central areas, whereas sand gazelles were mainly concentrated in the south but showed a broader distribution during this survey, possibly linked to reduced tourism activity. No MSV target species were recorded, although several bird species, including Shikra, Cormorant, Common Cuckoo, and an unidentified eagle, were observed.

The survey suggests that gazelle populations remain stable overall, while seasonal conditions continue to influence grouping behaviour and habitat use.

CONTENTS

1 INTRODUCTION

The Dubai Desert Conservation Reserve (DDCR) is the United Arab Emirates' first national park, established by royal decree in 2003. Covering approximately 225 km², it represents around 4.7% of Dubai's total land area and was created to conserve a representative sample of the country's original inland desert ecosystem, along with its native biodiversity. Today, the reserve supports a wide range of species adapted to hyper-arid conditions, including three ungulates: the Arabian Oryx (*Oryx leucoryx*), Arabian Gazelle (*Gazella arabica*), and Sand Gazelle (*Gazella marica*).

The Arabian Gazelle is a small, slender ungulate weighing between 12 and 16 kg, characterised by a light brown coat, white underparts, and distinctive facial markings. The species is currently listed as Vulnerable, with an estimated global population of 5,000–7,000 mature individuals (IUCN SSC Antelope Specialist Group, 2017). The sand gazelle, slightly larger at 15–25 kg, displays sandy-coloured upperparts and pale ventral areas, and is also classified as Vulnerable, with a global population estimated at 1,750–2,150 mature individuals (IUCN SSC Antelope Specialist Group, 2017).

Both species have experienced significant declines across their historical range due to hunting, habitat degradation, fragmentation, and competition with livestock. In the UAE, conservation efforts began in 1999 with reintroduction programmes in the Al Maha Reserve, now part of the DDCR, and have since expanded to include protected areas and targeted management initiatives (Javed, Garcia-Rawlins, Rodriguez, Sakkir, & Dhaheri, 2020).

As part of the DDCR's Major Site Values (MSV) monitoring programme, ungulates are regularly surveyed through weekly counts conducted along the main road network, particularly near feeding stations. While these counts provide valuable long-term data, their reliance on accessible routes limits spatial coverage and may introduce bias. Consequently, targeted surveys focusing specifically on gazelles are necessary to obtain more comprehensive and reliable population estimates.

To address this, a biannual survey approach has been implemented, with surveys conducted in spring and winter to capture seasonal variation in gazelle ecology. These periods reflect differences in environmental conditions, particularly vegetation availability, which is expected to influence gazelle distribution, behaviour, and grouping patterns. The present survey aims to estimate population size, assess spatial distribution, and examine key ecological aspects of both gazelle species, contributing to improved monitoring and management strategies within the reserve.

Although the primary focus of this study is on gazelles, additional MSV species are also recorded opportunistically due to their conservation importance. These include species such as the Asian houbara (*Chlamydotis macqueenii*), Pharaoh Eagle-owl (*Bubo ascalaphus*), and Lappet-faced Vulture (*Torgos tracheliotos*).

2 METHODOLOGY

The survey was conducted on March 25th, 2026, from 6:15 AM to 10:30 AM with a total of 15 participants. The reserve was divided into seven distinct areas: Central, North, South, Al Maha Resort, Al Maha, Margham and Fenceline (Figure 1). The surveyed areas remained consistent with those of previous surveys (Jaradat, et al., 2021) (DDCR, 2024), (DDCR, 2025).

Participants were organized into seven 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.

Maria Jose Martin, DDCR Conservation Officer, provided training on species identification and sex determination for all target species 30 minutes before activities began. Main roads and tracks were used to cover the entire reserve, and all areas were counted simultaneously to eliminate double-counting as much as possible. Four irrigated zones were included in the survey, 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. 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. Juveniles were not gendered and individuals that could not be grouped under gender or age were recorded as "unidentified" (Figure 2).

No.	Survey Team	No. Members	Area	Track colour in map	Total Km driven
1	Gerhard, Dounia	2	Central	Green	40
2	Aline, Norbert	2	North	Blue	47
3	Basil, Caleb, Anais	3	South	Purple	29
4	Rashid Jr., Rafiq	2	Al Maha Resort		
5	Maria, Janka	2	Al Maha	Pink	58
6	Mohammed, Khaseem	2	Margham	Blue	29
7	Felix, Suhaib	2	Fence	Black	135.7

Table 1 *Team effort during survey*

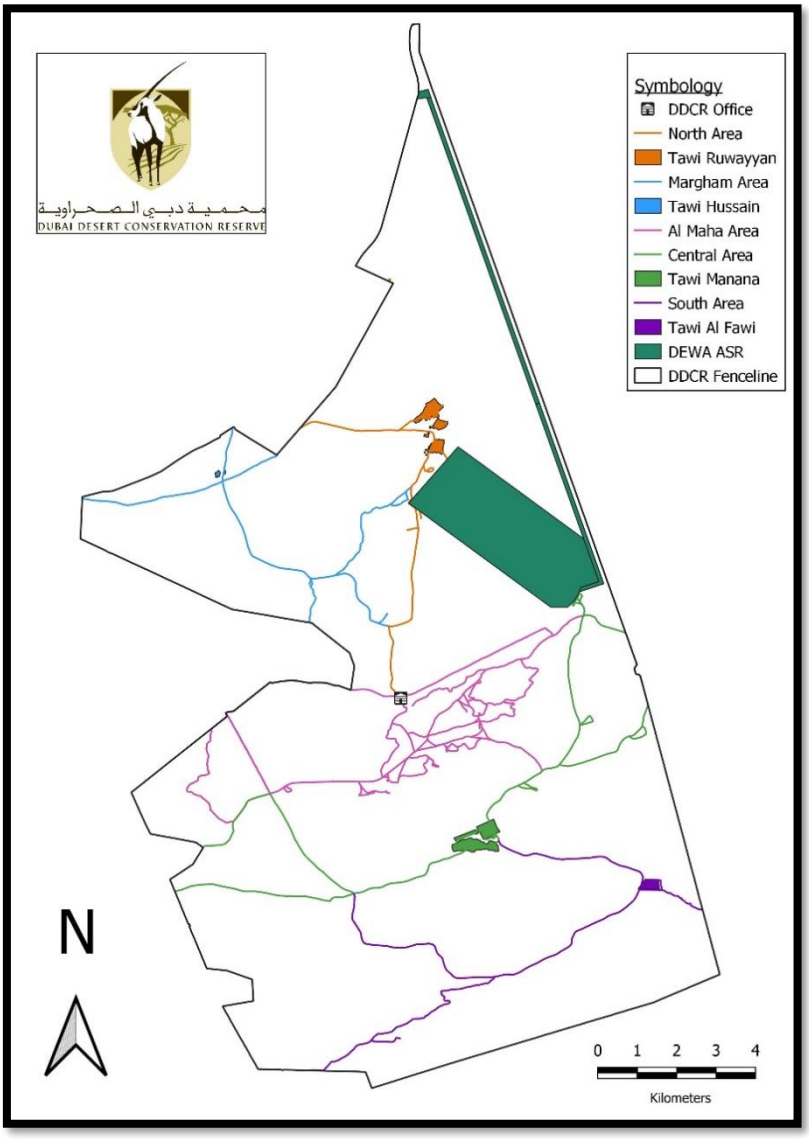


Figure 1 *Map of surveyed areas*

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*

3 Results & Discussion

Survey teams recorded a total of 755 Arabian gazelles, including 261 males, 422 females, 69 juveniles, and 3 individuals whose sex could not be determined.

For Sand gazelles, 164 individuals were observed, consisting of 74 males, 85 females, 1 juvenile, and 4 individuals of unidentified sex.

No species included under the MSV were detected during the survey period. However, several bird species were recorded, including a single unidentified eagle, two Shikras (*Tachyspiza badia*), one Common Cuckoo (*Cuculus canorus*), and eight Great Cormorants (*Phalacrocorax carbo*) (Table 2).

Species	Total	Males	Females	Juveniles	UnID
Arabian Gazelle	755	261	422	69	3
Sand Gazelle	164	74	85	1	4
Eagle	1				1
Shikra	2				2
Cormorant	8				8
Common Cuckoo	1				1

Table 2 *Gazelle count survey results, including other species recorded.*

➢ Abundance of Gazelle Species

The Arabian gazelle was the most abundant species recorded, with a total of 755 individuals. The previous survey, conducted in November 2025, recorded 680 individuals (DDCR, 2025). This increase of 75 individuals (11%) was higher than expected. Following the wet season, we expected gazelles to become more widely dispersed across the reserve; however, numbers remained concentrated in known areas.

These results suggest either a genuine population increase or that individuals are maintaining strong site fidelity to their preferred roaming areas regardless of seasonal changes.

Looking at the overall trend of the species during the last 3 years (Figure 3), it is important to highlight the consistent increase in the number of individuals across surveys, which may require a more detailed assessment to inform appropriate management strategies.

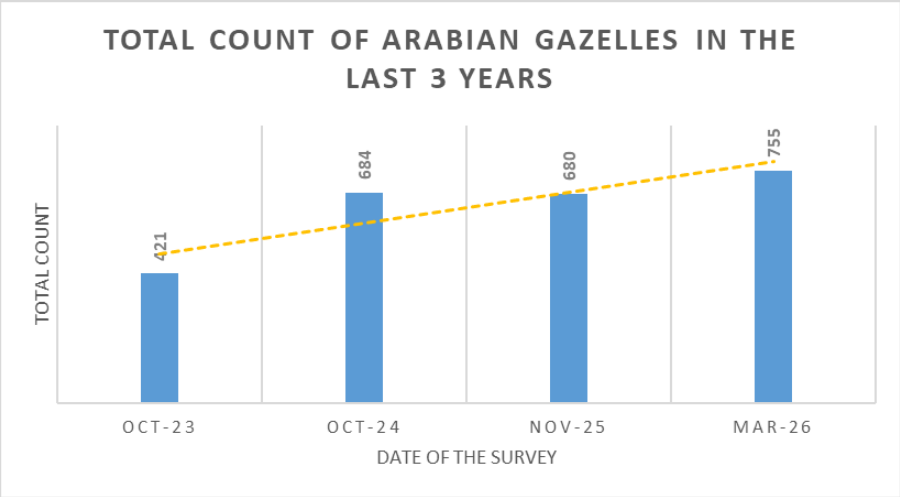


Figure 3 *Arabian Gazelle Population Counts per Survey (2023–2026)*

Since gazelle surveys have been usually conducted only once per year, the DDCR team performs weekly counts to provide a continuous, indicative estimate of ungulate populations throughout the reserve. This monitoring programme compiles observations of all three ungulate species recorded along fixed routes, covering accessible roads and areas near feeding stations.

While these counts are not directly comparable to the annual surveys due to methodological differences, they provide valuable insight into short-term trends and population dynamics over time.

For the Arabian gazelle, the weekly counts recorded 571 individuals during the same period, which is notably lower than the 755 individuals observed in the annual survey. This difference is expected, as weekly counts are restricted to specific accessible areas, whereas the annual survey covers a much wider portion of the reserve. As a result, large areas remain unsampled during weekly monitoring, likely leading to an underestimation of the true population size.

In the case of the Sand gazelle, no significant increase was recorded. During the present survey, a total of 164 individuals were observed, which is consistent with the numbers recorded in the previous survey conducted in November 2025 (DDCR, 2025). In the last three years, there has been an increase in the total count, although it remains quite stable.

However, this count is considerably lower than the weekly counts conducted along feeding routes, which recorded 361 individuals during the same week. Differences in survey timing and methodology may partly explain this discrepancy. Annual surveys are conducted shortly after sunrise, whereas weekly counts take place between 05:00 and 08:00, which may influence detectability. In addition, identifying Sand and Arabian gazelles under field conditions can sometimes be challenging, potentially affecting the accuracy of species-specific counts.

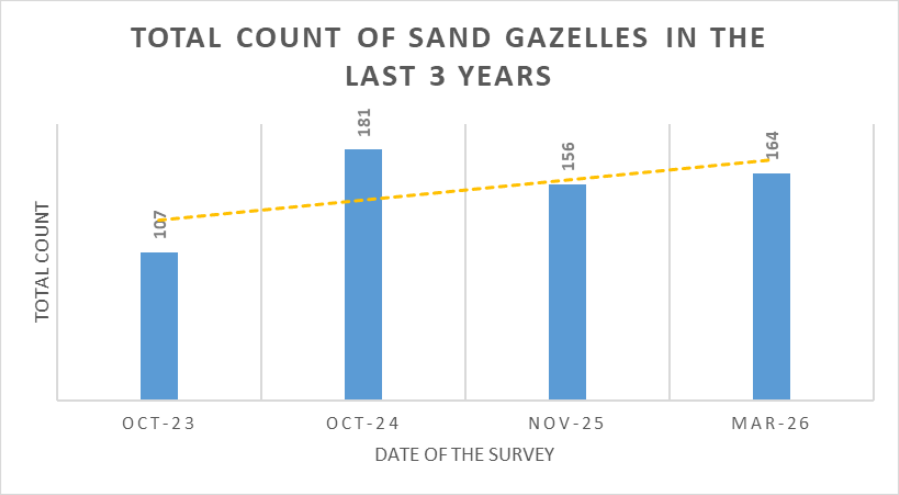


Figure 4 *Sand Gazelle Population Counts per Survey (2023–2026)*

➢ SOCIAL STRUCTURE

Apart from their total numbers, it is important to analyse their social structures. Both gazelle species are social and are therefore typically observed in groups. This survey was conducted in March, coinciding with the period of spring aggregation (Blank, Ruckstuhl, & Yang, 2012) during which individuals are expected to form groups. Accordingly, nearly 90% of Arabian gazelles were observed in groups of two or more, while only 10.9% were recorded as solitary individuals (Figure 5).

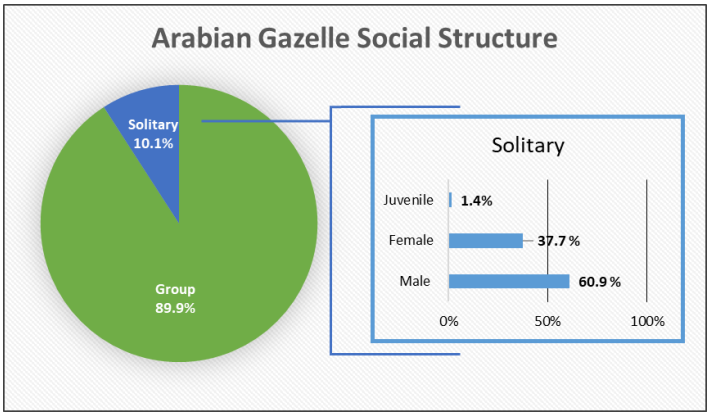


Figure 5 *Arabian Gazelle Social Structure*

Among solitary individuals, males were the most recorded, accounting for 60.9%, followed by females at 37.7%, while juveniles were rarely observed alone (1.4%). This indicates that solitary behaviour is mainly associated with adults, particularly males, while juveniles remain closely linked to groups, likely due to their dependence on protection and maternal care.

Sand gazelles were also observed primarily in groups (71.9%), while 28.1% of individuals were recorded as solitary (Figure 6). This confirms that the species is largely gregarious, although a noticeable proportion of individuals occur alone.

As observed in Arabian gazelles, all solitary Sand gazelles recorded during the survey were adults, with no juveniles observed alone.

Among solitary individuals, males and females were equally represented (50% each). Combined with the relatively high proportion of solitary individuals, this suggests that Sand gazelles have a less cohesive social structure than that observed in Arabian gazelles.

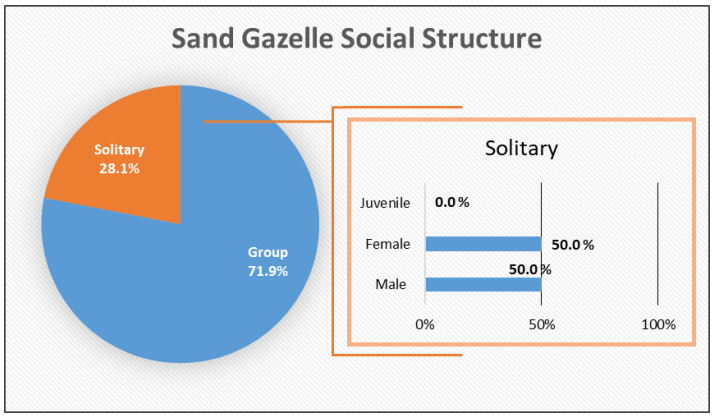
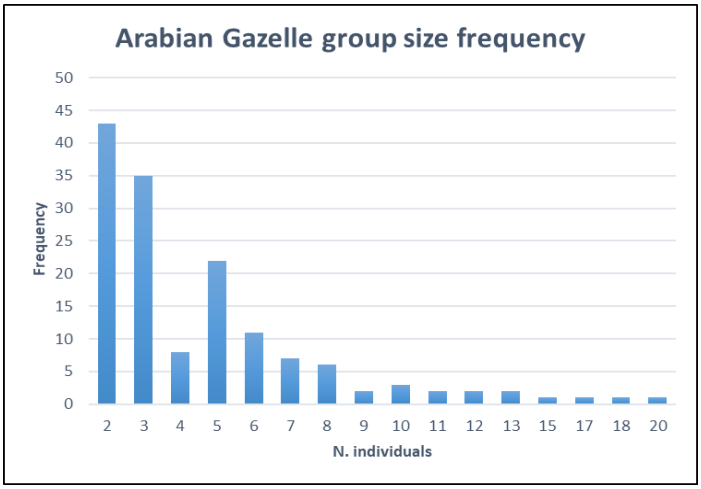


Figure 6 *Sand Gazelle social structure*

The predominance of grouped individuals in both Arabian and Sand gazelles is consistent with the spring aggregation period described by Blank, Ruckstuhl, and Yang (2012), during which gazelles are expected to form larger social groups. The high proportion of grouped individuals recorded during this survey supports this pattern. However, solitary individuals were also observed in both species, indicating that not all animals participated in aggregations and that group cohesion varied between individuals.

➢ GAZELLE FREQUENCY

A more detailed look at group size shows that Arabian gazelles are most observed in very small groups, with pairs being the dominant group type. Groups of three individuals were also relatively frequent, while larger groups occurred much less often (Figure 7). This distribution suggests that the social organisation of Arabian gazelles is centred around small, stable units, with larger aggregations likely linked to the spring aggregation period.



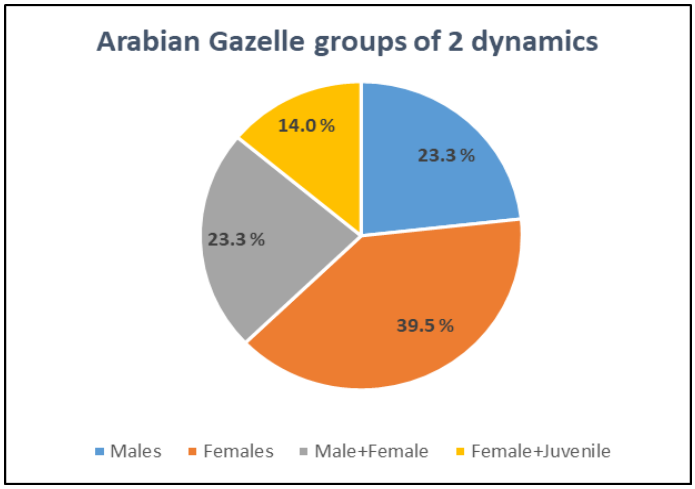
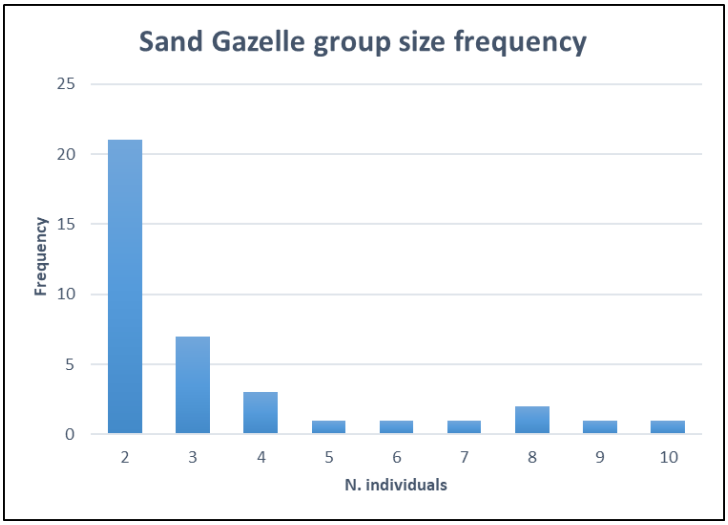


Figure 7 Left*: Frequency of each group size - Arabian Gazelle;* ***Right****: Dynamics of the groups of 2 - Arabian Gazelle*

When looking at pair composition, female–female associations were the most frequently recorded, followed by male–male and mixed pairs in similar proportions. This suggests that females tend to form stronger associations with one another, while male associations appear to be more variable.

A similar pattern was observed in Sand gazelles, where small group sizes were clearly dominant. Pairs were the most common group size recorded, followed by groups of three and four individuals, while larger groups were uncommon (Figure 8). Female–female associations were again the most frequent, followed by mixed pairs and, lastly, male-only pairs. These observations suggest that Sand gazelles also form stable female associations, while mixed and male-only groups may reflect reproductive or temporary social groupings. Compared with Arabian gazelles, however, Sand gazelles showed a more even distribution of group sizes and a higher occurrence of solitary individuals, suggesting a less consistently aggregated social structure.



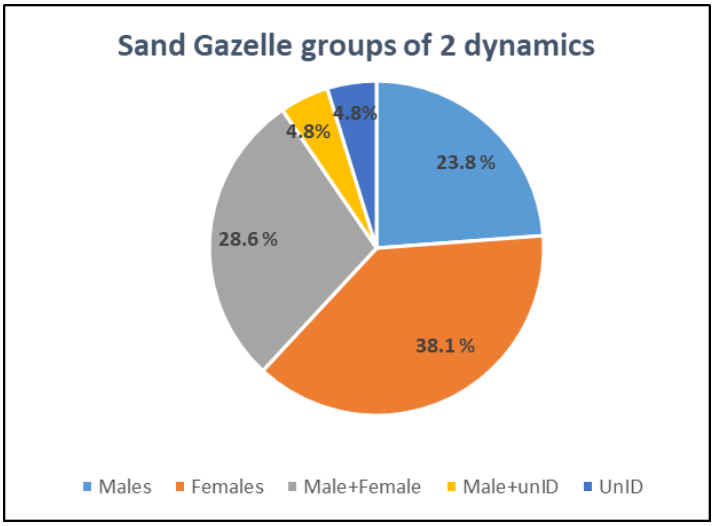


Figure 8 Left: *Frequency of each group size - Sand Gazelle;* ***Right****: Dynamics of the groups of 2 - Sand Gazelle*

When comparing these patterns with previous studies, it is important to note that Sand gazelles (*Gazella marica*) were historically considered a subspecies of the Goitered Gazelle (*Gazella subgutturosa*), and therefore similar social behaviour might be expected. However, more recent research shows that these are distinct species with ecological differences, which can influence their behaviour.

In this study, Arabian gazelles appear to follow the typical seasonal aggregation pattern described for *G. subgutturosa*, with a strong tendency to form groups during spring (Blank, Ruckstuhl, & Yang, 2012). In contrast, Sand gazelles show a weaker aggregation pattern, with more variable group sizes and less overall cohesion.

At the same time, the dominance of pairs in both species is consistent with previous studies describing gazelles as forming small, flexible social units, usually consisting of two to three individuals (Blank, Ruckstuhl, & Yang, 2012) (Wacher, et al., 2025). This can indicate that while seasonal factors influence how much individuals group together, small group size is a general characteristic of gazelle social organisation.

➢ GAZELLE DISTRIBUTION

The highest concentrations of Arabian gazelles were recorded in the central gravel plains of the reserve, particularly in the areas surrounding Al Maha Resort and the DDCR Office (Figure 9 Left).

This species is widely distributed throughout the reserve, with most individuals associated with vegetated and irrigated habitats. No observations were recorded in the northern section during the survey; although this likely reflects limited survey coverage, as no main roads were included in this area. Actually, staff are aware of resident groups in the north, supported by observations along secondary tracks leading to tour operator camps where feeding stations are present. In addition, a group is known to live in the northernmost rocky outcrop of Nazwa. Although access to Nazwa remains restricted due to ongoing projects, gazelles continue to inhabit this area.

These observations also highlight behavioural differences between species since the Arabian gazelles appear to be more tolerant of human presence and are frequently encountered near areas with tourism-related activities.

This distribution broadly reflects patterns recorded in previous surveys (Jaradat et al., 2021; DDCR, 2023), although the current results indicate a slightly more widespread use of available habitats.

Following the completion of the DEWA ASR Project, gazelles are now regularly observed in and around the fenced area, suggesting that they are more used to its presence and no longer visibly affected by the infrastructure.

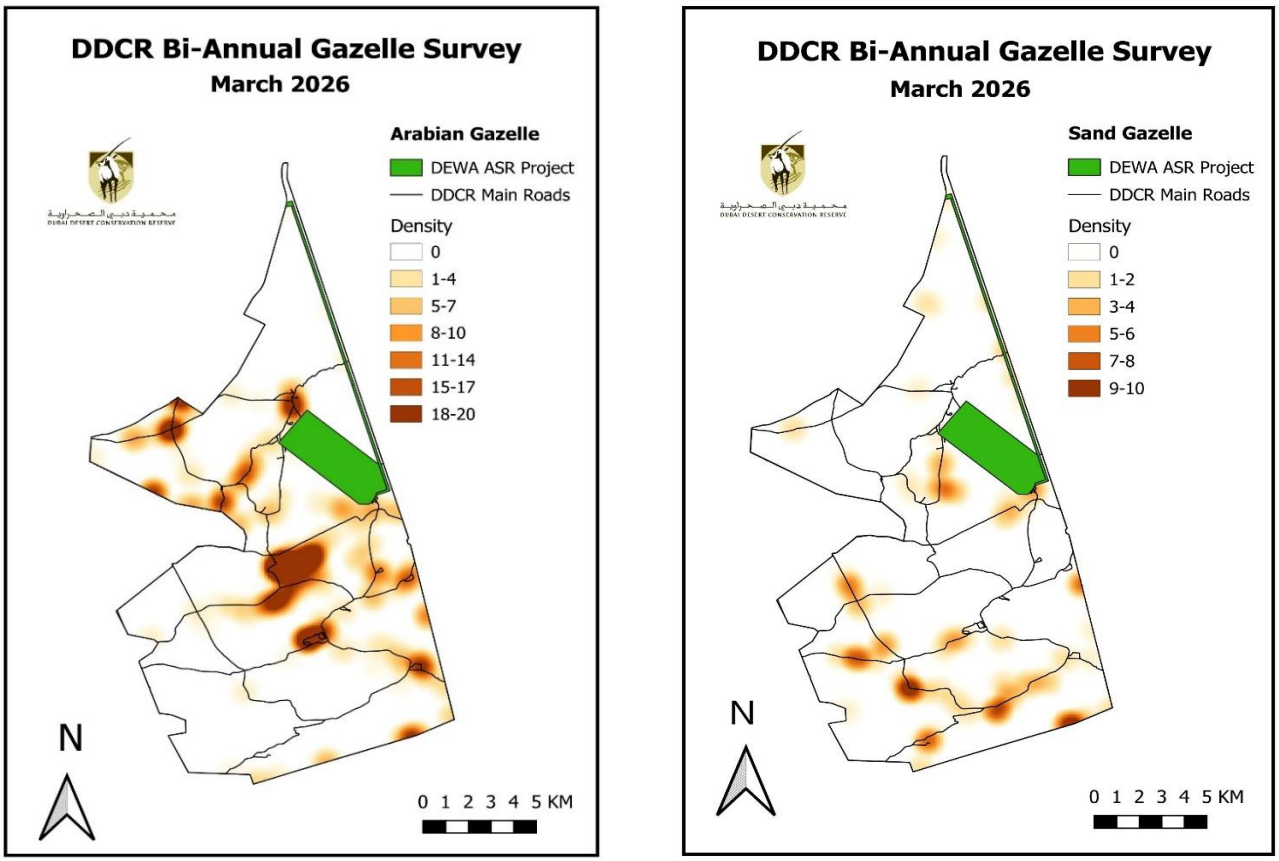


Figure 9 Left: *Arabian Gazelle distribution in the DDCR.* ***Right:*** *Sand Gazelle distribution in the DDCR.*

Sand gazelles were predominantly recorded in the southern part of the reserve (Figure 9 Right), reflecting the species' preference for more secluded habitats with lower levels of disturbance. This pattern is consistent with routine monitoring observations at DDCR, as the southern sector generally experiences reduced human activity, which likely supports a higher occurrence of this species. Their distribution remains largely associated with central-southern areas characterised by Ghaf groves and established feeding stations, showing the continued importance of these habitats.

However, during this survey, sand gazelles appeared more widely distributed across the reserve, with multiple observations in northern and central areas where the species is not typically encountered. This shift may be linked to the current reduction in tourism-related activities, potentially allowing individuals to expand their range into areas that are usually subject to higher disturbance.

➢ OTHER ENCOUNTERS

No MSV priority species, such as the Asian Houbara, Lappet-faced Vulture, or Pharaoh Eagle-owl, were observed during this survey. However, several incidental sightings were documented across different areas of the reserve (Figure 10). An unidentified eagle was recorded in the north-central section, in a vegetated area known as Tawi Ruwayyan, while a Shikra was observed in the eastern sector, also within a Ghaf-dominated habitat. A total of eight cormorants were sighted at Tawi Manana, a man-made lake that attracts freshwater and water-associated bird species. In addition, a Common Cuckoo was recorded in the southernmost part of the reserve. Although the species has been observed previously, this represents the first photographic record within the DDCR.

These observations highlight the use of a variety of habitats by bird species within the reserve, ranging from vegetated inland areas to locations associated with water sources. Although limited, these records contribute to ongoing monitoring efforts and provide additional insight into species occurrence and habitat utilisation across the DDCR.

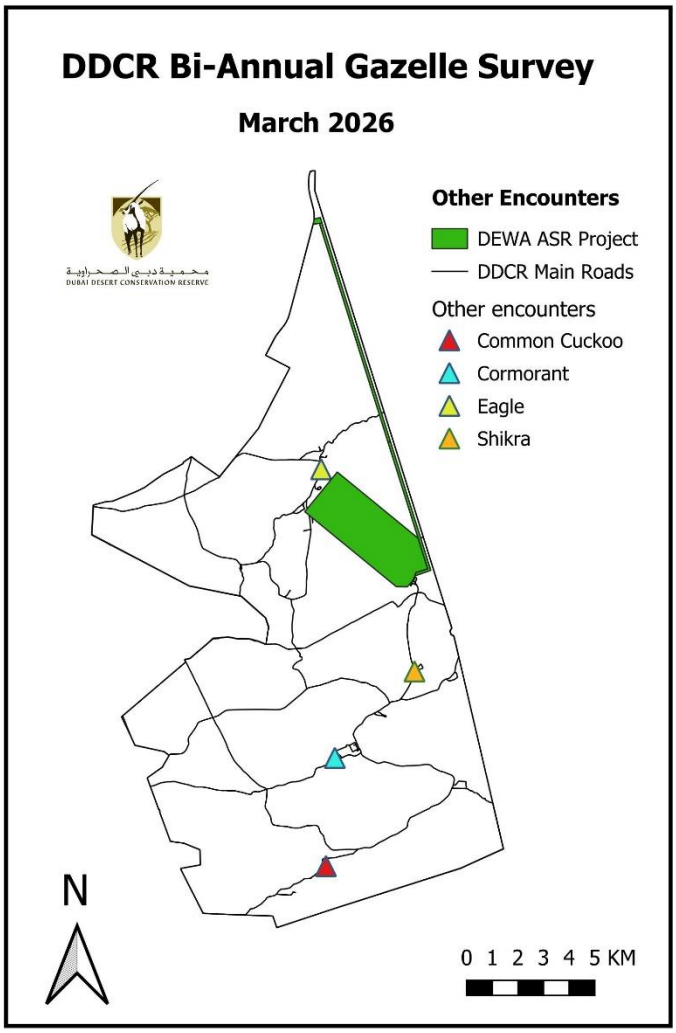


Figure 10 *Other species recorded during the survey.*

4 CONCLUSION

This study forms part of a new bi-annual survey programme designed to capture seasonal variation in gazelle ecology within the DDCR. The March survey provided further evidence that both gazelle behaviour and distribution vary seasonally, highlighting the importance of conducting surveys at different times of the year. The broader distribution of Sand gazelles observed during this survey may be linked to the current reduction in tourism activity, although continued monitoring will be necessary to determine whether this pattern persists. A second survey will be carried out in winter, when natural forage availability is typically reduced.

Future surveys should be aligned with key behavioural periods in the annual gazelle cycle, including the onset of the rut, peak rut, and spring aggregation. This would improve the ecological relevance of the data and facilitate comparisons between surveys.

Maintaining consistent survey methods and expanding coverage beyond the main road network would improve future population estimates and provide a more complete picture of gazelle distribution within the reserve.

Finally, the ongoing collaboration with the United Arab Emirates University will help address current knowledge gaps regarding the genetic diversity and population structure of Arabian and Sand gazelles within the DDCR, providing valuable information to support future conservation management.

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