



محمية دبي الصحراوية
DUBAI DESERT CONSERVATION RESERVE



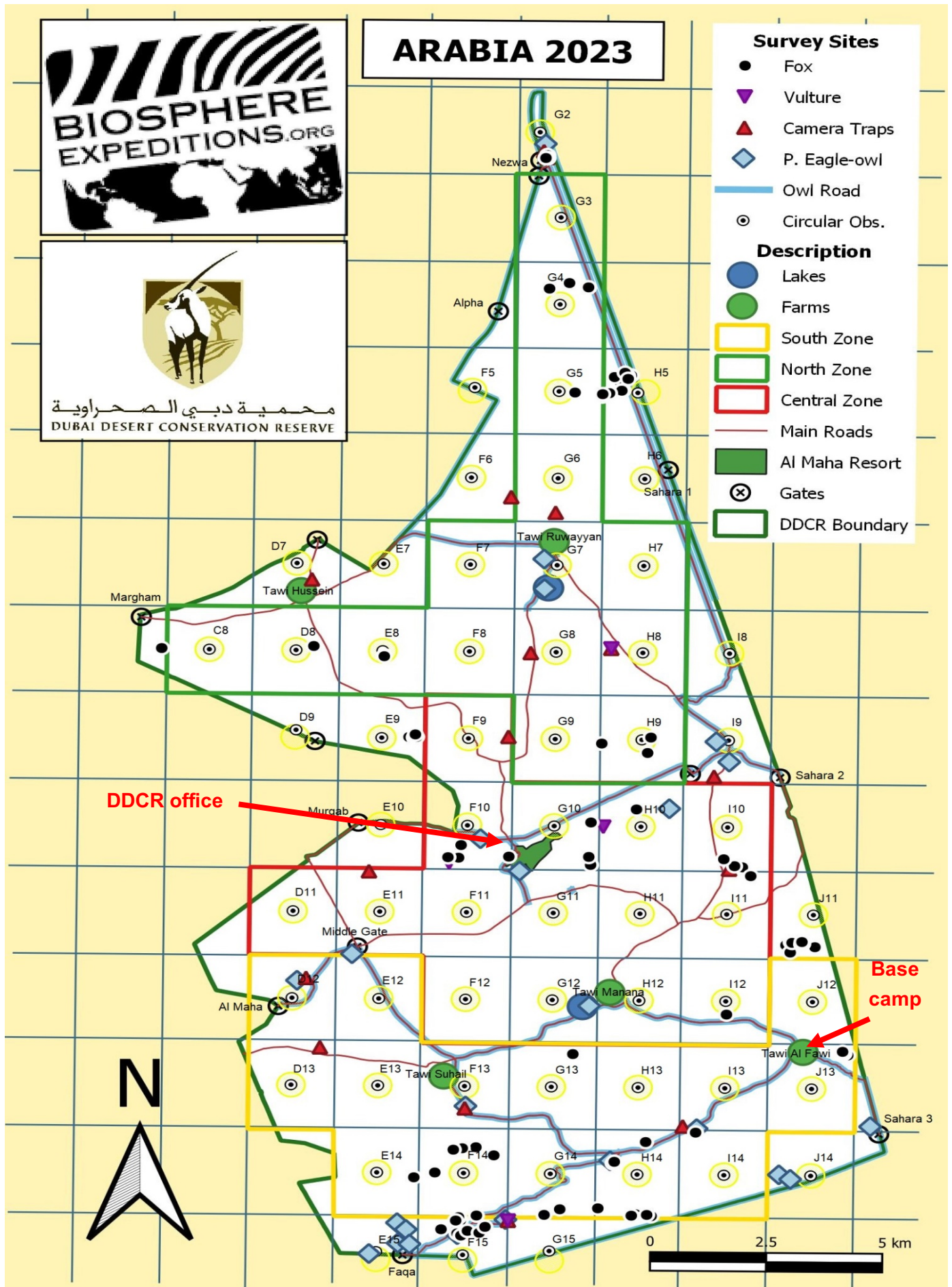
RESEARCH & EXPEDITION MANUAL

Version 2023

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MAP OF THE DDCR



FIELD SAFETY PROCEDURES

Remember to (1) always sign in and out of the logbook, (2) have at least one mobile phone in each group, and (3) take with you the mobile phone list and the emergency & safety procedures.

Cut-off times: All research teams should be back at the time they have indicated in the logbook and by 17:00 at the very latest. If you are going to be later than this, call someone else on the team to carry a message if possible. If you are more than 30 minutes late and we have not heard from you, we will come and look for you.

EMERGENCY PROCEDURES

Following an accident, follow these procedures: (1) Those not injured on the team secure the casualties and administer first aid. (2) Contact Expedition Leader (EL) or Scientist (SC) by radio or mobile phone, and give details of the injuries and EXACT location. (3) The EL or SC will make an assessment of the incident using the following distinctions:

High priority: Immediate, potentially life-threatening injuries. Examples would include head injuries, open fractures, loss of consciousness. The EL or SC will contact the medevac services.

Medium priority: For example injuries which may be debilitating and require assistance but are NOT immediately life threatening. The EL or SC will contact medical services in Dubai and either arrange evacuation or ask you to bring casualties yourself if you are in a functioning vehicle.

Low priority: The EL or SC will arrange for the injured party to be recovered by assistance of other team members and expedition vehicles only or ask you to bring casualties yourself if you are in a functioning vehicle. Evacuation to medical services in Dubai as necessary.

If you are unable to contact either EL or SC, then it will be up to the team members to carry out the above assessment. It is essential that you do this as calmly as possible and decide the best course of action, which will not make the situation worse.

CONTACT NUMBERS

See sheet and WhatsApp group + Emergency Services Dubai: 999. Mediclinic Welcare Hospital (for injuries): +971-4-2827788 or +971-4-2828226.

Invoke the helicopter emergency evacuation service only for immediate, potentially life-threatening injuries. Call them via the emergency services with an exact GPS position of where you require the helicopter to land. When you call 999, you will get through to a police officer who will coordinate rescue efforts. Only call 999 if you are unable to reach staff and time is of the essence. Note if the helicopter is deployed, the individual will be taken to Rashid Hospital in Dubai (government hospital).

SURVEYS OVERVIEW

Expedition participants will assist DDCR scientists in six important surveys: (1) Species encounter in quadrant survey, which also includes part of the ungulate survey (Arabian Oryx, Arabian gazelle, sand gazelle), (2) Arabian red fox den survey, (3) Pharaoh Eagle-Owl survey, (4) Lappet-faced vulture survey and (5) camera trapping (targeting Gordon's wildcat and both fox species). In addition to these surveys, participants will record any species observed while in the field via (6) random encounters).

After training, you will split into groups to conduct the various surveys, in four separate zones of the DDCR (North, Central, South and Perimeter Zones). Each zone comprises fifteen 2 x 2 km quadrants, the perimeter zone comprises of 17 partial quadrants. These 62 quadrants together represent approximately 214 km² of the 225 km² of the DDCR (or 95%). The area includes all key habitats of vegetated dunes, sand dunes and gravel plains.

Species encounter in quadrant survey

Every day a group will be tasked with surveying quadrants, during which all species encounters will be recorded in datasheets. You will select one observation point within 300 m of the centre of the quadrant, which provides a good vantage point. From this vantage point you will carry out a 360° circular observation of the surrounding area with binoculars for 30 minutes. This survey is conducted between 08:30 to 15:30 mostly.

Species observed during these surveys will be recorded in the datasheets as follows:

- Species name
- GPS position of researcher when the species was first seen
- Distance and bearing from researcher to target species
- Time of day when the species was observed
- Ecological information such as number of animals, sexes etc.
- Additional comments.

Arabian red fox den survey

All dens have been classified as either active, inactive or abandoned based on signs of fox activity such as tracks, fresh digging, prey remains and fresh scat. You will revisit all dens previously identified as active or inactive and you will help classify them as active, inactive, or abandoned based on signs of fox activity. In addition, you will also search the area around each den in a 500 m radius to classify any new dens found and record their GPS coordinates.

Pharaoh Eagle-owl survey

All previously identified nesting and roosting sites will be revisited along with previously selected survey sites and tracks in the North, Central and South zones. You will record number of individuals, coordinates, and behavior (roosting or nesting) in the datasheets. Each sighting should be marked in the GPS and scored as a roosting or nesting site. If any nests are found, number of eggs and location (rock crevice, under "x" type of bush, etc.) should be noted. Pictures of sightings should be taken whenever possible.

Lappet-faced vulture survey

You will visit four previously selected survey sites every day before 15:00 to record the following on datasheets: vulture group size, age (adult or juvenile), time, date and behavior. Additionally, you will note down if any other species of vulture is present at the site with number of individuals for each species.

Camera traps survey

As many species in the desert environment are rare and elusive, camera traps are one of the best tools to collect information on their population and behaviour. On the second day of the expedition you will be setting up camera traps distributed across the DDCR, mainly to elucidate the status of Gordon's wildcat. Data will be collected and revised on the second to last day of the expedition.

The DDCR carries out camera trap surveys of seven water holes on a year-round basis. If at any given moment you find you've completed all your allocated activities for the day, but wish to do more, you are more than welcome to help us sort collected camera trap data.

Random encounters

Whenever you are in the DDCR and come across something interesting, which you think is worth reporting, record it in the random encounters datasheet. Supplement your record with pictures or other pieces of evidence where possible.

Examples:

- Vultures gathering round a carcass
- A large, interesting lizard
- Hares
- Migratory birds
- Any cat
- Orxy groups of more than 10 individuals (but not at a feed spot)
- Gazelle groups of more than 5 individuals (but not at a feed spot)

If you are a birder, feel free to record away, but remember this is not a birding expedition, so record birds on the fly only. Ignore doves, white-eared bulbuls, house sparrow and common myna as they are common.

MAMMALS IN THE DDCR

Note that each car will carry two field guide books: “Birds of the Middle East” and “Field Guide to Emirates” with more descriptions and pictures of animals (including birds) and plants you are likely to find in the DDCR. Please use these and all other resources available to you to identify target animals as accurately as possible.

Arabian Oryx (*Oryx leucoryx*)

The Arabian Oryx is uniform white, while the flank stripe is absent or only an indistinct smudge.

The lower limbs are a chocolate brown to black with the exception of pure white patterns. The face and nose have dark patches and there is often a dark stripe that runs under the neck to the forelegs.

In summer, the dark patches are lighter and often absent altogether. Calves are a uniform brown colour.

Al Maha is one of the many local names used to describe the Arabian Oryx (المها).

Female Oryx weigh about 80 kg and males about 90 kg. Occasionally males may reach 100 kg. In good grazing conditions, oryx may live to 20 years. In drought conditions, life expectancy is greatly reduced.

Distinguishing sexes & ages

Males are usually stockier with thicker horns, but this gets difficult when faced with e.g. an old female or a young male. A surefire way to distinguish them is to look for a dark genital sheath or testicles. Juveniles are white and calves are brown.



Adults



Juvenile

Arabian gazelle (*Gazella arabica*)

Of all *Gazella* species, the Arabian gazelle is the most slender. The coat is fawn to dark-brown on the back, neck and head, while the belly and buttocks are pure white, separated on the flanks by a dark narrow band. The coat is short, sleek, and glossy in summer, reflecting much of the sun's radiation.

In winter, the pelage is much longer, dense and rainproof, and not glossy. Seasonal variations in the pelage are much less in desert subspecies.

The face has two conspicuous white stripes extending from the eyes towards the nostrils with dark-brown to black lower margins, coupled usually with a black spot on the muzzle above the nose. The male's horns are quite long (22–29.4 cm), while those of females are generally shorter (5.8–11.5 cm).

Desert subspecies weigh only 12–16 kg, longer-legged and with a relatively longer body and ears than mountainous subspecies. Arabian gazelles can reach speeds of 65 km per hour, if in danger.

Their diet comprises grasses, herbs, and shrubs, depending on the habitat. They move in small herds of 4–6 animals and most grazing takes place at dawn and dusk. They rest during the hottest hours under shelter, which may be trees or bushes in the desert.



Female Arabian gazelle



Male Arabian gazelle

Sand gazelle (*Gazella marica*)

This is the second largest antelope of the UAE. Unlike most gazelles, females of this species are mostly, although not always, hornless, while males boast long, elegantly curved, lyre-like, black horns that diverge outwards and turn back in at the tip. Interestingly, horn development in females increases from Mongolia and China, where they are almost completely hornless, to the Arabian Peninsula, where they have well-developed horns.

They vary in colouration between populations, from nearly white to brown with different tones of grey, red, or yellow. Generally, the very light brown colouration of the back darkens towards the flanks, where it meets the white under parts in a crisp line, and the black colouration of the first two thirds of the tail contrasts starkly against the white of the buttocks.

Eyes are large and black, and the ears are long. Legs and neck are relatively long and the tail is quite short.

Males are larger and heavier than females, weighing up to 22kg.

Their preferred habitat is in the sandy desert areas of shifting dunes and herds commonly consist of 6-12 individuals. During the summer months these gazelles will feed at night, obtaining most of their water requirements from the plants they eat.



Male sand gazelle



Female sand gazelle

Arabian red fox (*Vulpes vulpes arabica*)

The Arabian red fox is the largest of the three fox species found in the UAE and similar in colour to the common red fox. However, it is more adapted to desert life than that species and is a brownish pale red colour. The throat is black and the abdomen is white.

The lower legs and ears are reddish, with a reddish-brown bushy tail, tipped in white. Its ears are much larger, and its body is much smaller than that of the Red Fox. It also has fur between its toes, to prevent burning of the feet on the hot desert sand.



Rüppell's Fox (*Vulpes rueppellii*)

Slightly smaller in build than the red fox. Ears are long and large in relation to the head. Coat colour is variable, head is beige to pale sand colour. The ears and face are usually pale, with most animals having black whisker patches running up to the eye, although this too is variable.

The colour on the back varies from pale sandy to greyish and even sometimes reddish, with a more or less silvery sheen due to black speckling being present. Flanks and underbody are usually paler. Legs are beige to fawn colour. Their average weight is 1.5 kg – 1.8 kg. It is nocturnal, coming out at night to hunt rodents, reptiles, birds, and insects, as well as feeding on wild fruits.



Arabian wildcat (*Felis lybica lybica*)

The Arabian wildcat (or Gordon's wildcat) is the same size as your domestic cat. The background colour of its coat ranges from reddish to sandy yellow to tawny brown to grey, and is typically marked with faint tabby stripes and spots.

A characteristic feature is a reddish or rusty-brown tint to the backs of the ears, and three black rings on the tail, which ends in a black tip. There are also black stripes on the inner foreleg and the soles of the feet are also black.

Their preferred habitat is the vegetated dunes, gravel plains, and mountains, in which they hunt a mainly carnivorous diet at night. They can live up to 15 years. Weight around 4-5 kg.

The biggest threat to the survival of the Arabian wildcat as a species is the interbreeding with feral or domestic cats, which could lead to its extinction as a distinct species.



Arabian hare (*Lepus capensis*)

The Arabian hare is much smaller than the hares in Europe and Africa. Colour may vary from brown to greyish with white undersides. Tufts of soft hair grow between the pads on its feet. Large ears can dissipate body heat through many superficial blood vessels, for cooling, when temperatures are too high for their ears to radiate heat.



Arabian hares reduce blood flow to the ears and lay them flat against their body, thus providing shade. Unlike rabbits, hares do not live in burrows but spend the day motionless in shallow scrapes under bushes or in the open with ears folded back, relying totally on camouflage for protection.

Ethiopian hedgehog (*Paraechinus aethiopicus*)

It has large ears and a black snout with a white band across the forehead. The tips of the spines are white, providing an overall grey appearance. Weighing 280-510 grams. Typically, the lifespan of a hedgehog in the wild is 3-4 years. In captivity, they have been known to live as long as 10 years.

They sleep on their sides, so their spines give them little protection while at rest. They hunt at night, on insects and other prey which congregate near the coastline or inland vegetation around an oasis.

During prolonged periods of cold weather, hedgehogs hibernate, waking periodically to forage for food. These periods of hibernation may be necessary as a result of the poor insulation offered by their spines. It is mainly insectivorous, but it eats a variety of foods when they are available. It is not, however, thought to eat plant matter.



Rodents

There are five species of rodents in the DDCR. Their preferred habitat is vegetated sand dunes and gravel plains; however, the Lesser Jerboa's habitat extends into true sand deserts. Four of them are on the whole nocturnal.

Their diet consists of plants, seeds, roots and, with the exception of the Cheesman's Gerbil, they also eat insects. The Arabian Jird is endemic to the Arabian Peninsula and appears to only occur between NE Saudi Arabia, northern Oman, and into the UAE.



Arabian jird



Baluchistan gerbil



Lesser jerboa



Arabian spiny mouse



Cheesman's gerbil

REPTILES IN THE DDCR

Sidh saw-scaled viper (*Echis carinatus sochureki*)

It is the most common snake in the UAE found in coastal plains, open desert, and mountainous habitats. This is the smallest of the local vipers and can grow to around 60 cm in length. Several rows of scales have minute projections which are rubbed together to produce a warning sound when the snake feels threatened.

The Sidh Saw-scaled Viper uses a side-winding motion to move in the sand, traveling at about 45° to the line of its body. This leaves characteristic shallow “S” marks in the sand. It’s a nocturnal snake that preys on rodents, lizards and geckos.

This viper is a venomous snake that produces haemotoxic venom, which has a damaging effect on blood cells.



Arabian horned viper (*Cerastes gaspertii*)

Found throughout sandy areas of the Arabian Peninsula. Not all individuals have horns. It’s a light sandy colour and can grow up to 85 cm long. It also moves with a side-winding motion and uses haemotoxic venom to kill its prey, which consist of rodents, lizards, and birds.



Schokari sand racer (*Psammophis schokari*)

This snake is the most widespread and frequently encountered in the UAE. It is the longest snake in the country, reaching 150 cm. These snakes are diurnal and can move at speed of up to 16 km/h. They are mildly toxic and hunt rodents and young birds.



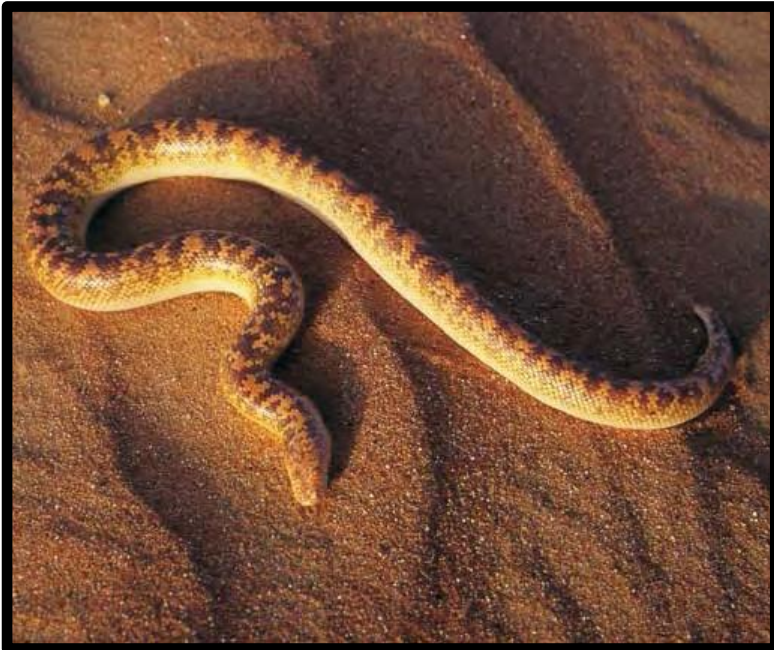
Hooded malpolon (*Malpolon miolensis*)

Widespread and relatively common. Can grow up to 150 cm, with yellow eyes and brown spots behind the eyes. When threatened it will raise the first third of its body while spreading a hood similar to the cobra. Mildly toxic, it will hunt birds, lizards, and small rodents at dusk and dawn.



Jayakar's sand boa (*Eryx jayakari*)

Widespread in the sandy areas of Arabia and the only species of boa in south-eastern Arabia. It grows to approximately 60 cm in length and has eyes and nostrils are on the top of its head which it leaves exposed while the rest of the snake is buried as it hunts. Prey consists mainly of reptiles and rodents.



Desert monitor (*Varanus griseus*)

The largest lizard in the UAE, it grows to 120 cm and also one of the most aggressive reptiles. When threatened, they will inflate their bodies with air and hiss loudly.

The desert monitor is an active hunter and will eat anything it can catch and overpower; this includes other reptiles, small mammals, birds, and even carrion.



Leptien's spiny-tailed lizard (*Uromastyx leptieni*)

A large lizard that can grow to 65 cm in length. It has a spiny tail which it will use in its defence. They are able to change their skin colour throughout the day. In the mornings, when they are cold, they are a dark gray. The dark colour absorbs the solar heat, which warms them up quickly. Once optimum body temperature is reached, they turn light sandy beige which then reflects the sunlight and prevents them from overheating.

Dhubs live in loose colonies on hard substrates such as gravel plains into which they can dig their deep burrows.



Yellow-spotted agama (*Trapelus flavimaculatus*)

This is a medium sized lizard of approximately 30 cm in length. Its preferred habitat is open gravel plains. Also known as the blue-headed agama because when the male displays to attract a mate, his body will be bright blue and his tail orange. They are a predatory species that will eat insects, reptiles, and even birds.



Arabian toad-headed agama (*Phrynocephalus arabicus*)

Widespread and common, this small lizard of approximately 10 cm occurs mainly on dunes and soft sand and is active during the day. When threatened, it can hide in the sand by vibrating its body to sink into the sand. The tail, of which the last third is black in the male, is used for signalling especially during the mating period. It will prey on insects.



Sand fish (*Scincus mitranus*)

It has smooth shiny scales and a wedge shaped head that enables the sand fish to swim through the soft sand of its preferred sandy dune habitat. It also has vertical black bars on its sides which are a distinguishing feature when compared to the similar sand skink (*Scincus scincus conirostris*) that also occurs in the UAE.



Geckos

There are a number of gecko species in the DDCR; all are delicate and fragile in appearance. They are all nocturnal hunters which prey on insects.



Baluch rock gecko



Arabian sand gecko



Dune sand gecko



Selvin's big-headed gecko

ARTHROPODS IN THE DDCR

Camel Spiders (*Solifugae*)

Also called solifugids, they avoid being out in the sun or bright light. When uncovered, a camel spider will frantically look for shade. The nearest shade often being at a person's feet – hence the undeserved reputation of being aggressive.

They have no venom in any part of their body. They are nocturnal predators. Using their speed as one of the fastest running arthropods to catch their prey and killing it with their strong mandibles.



Scorpions (*Buthidae*)

Their bodies have seven segments while their tail have five and they have four pairs of legs. They are nocturnal and will glow fluorescent when exposed to ultraviolet light. Scorpions prey on insects and spiders.

Only scorpions from the *Buthidae* family have been found in the UAE. Scorpion stings can be fatal, especially in people ages six and younger. Death from a scorpion is extremely rare. There hasn't been a reported death from a scorpion sting in the USA in more than 50 years. If stung, you might feel a sharp pain followed by numbness, drowsiness, and an itching of the throat. If you are stung, we will seek medical attention just to be on the safe side.



Thick-pincer scorpion



Black scorpion



Black-stinged scorpion

BIRDS IN THE DDCR

The majority of birds in the DDCR are migratory, drawn across from Africa and Asia. Migrants arrive between September and April. Migrating birds are often colourful while resident birds tend to be dowdy to blend in with the colours of the desert. More than 140 bird species, migrant and resident, have been recorded in DDCR till date. Below are a few common ones.

Note that each car will carry two field guide books: “Birds of the Middle East” and “Field Guide to Emirates” with more descriptions and pictures of animals (including birds) and plants you are likely to find in the DDCR. Please use these and all other resources available to you to identify target animals as accurately as possible.



Pharaoh Eagle-owl



Southern grey shrike



Crested sark



Arabian babbler



Eurasian stone curlew



Grey francolin



Isabelline wheatear



Brown-necked raven



Common myna



Red-wattled lapwing



Blue-cheeked bee-eater



Green bee-eater



Greater Hoopoe-lark



Desert wheatear



Eurasian collared dove



Chestnut-bellied sandgrouse



Purple sunbird



Laughing dove

VULTURES IN THE DDCR

Lappet-faced vulture (*Torgos tracheliotos*)

The second largest vulture in the UAE with a wingspan of up to 2.9 m. Dark brown above with contrasting white thigh feathers. Underside ranges from pure white to buff-brown. It has a bald head that is pink in the back of the head with grey on the front for adults, and juveniles with a completely grey head. In both cases the head has distinctive fleshy folds that give this species its name.



Lappet-faced vulture in flight



Lappet-faced vulture on the ground

Cinereous vulture (*Aegypus monachus*)

This is the largest vulture in the UAE with a wingspan of 3.1 m. Dark with the whole body brown, except for the pale head in adults, which is covered in fine blackish down. Skin on the face and neck is bluish-grey with a paler, whitish color above the eye. Adults have a purplish blue-grey bill, and pale blue-grey legs. Immatures appear sepia-brown above with much paler underside than adults, a grey down on the head, pale mauve cere and grey legs.



Cinereous vulture in flight



Cinereous vulture on the ground

Eurasian Griffon vulture (*Gyps fulvus*)

Large vulture up to 2.8 m in wingspan with white neck ruff, pale bill and grey face. Adults are gingery-buff above and below contrasting with dark flight feathers. Juveniles are a paler brownish-yellow on rear underwing coverts which give greater contrast with flight feathers.



Griffon vulture



Griffon vulture on the ground

Egyptian vulture (*Neophron percnopterus*)

A small vulture. The adult's plumage is white with black flight feathers in the wings and a yellow face with slender, black-tipped beak. Juveniles are blackish or chocolate brown with black and white patches, with greyish face. Adult coloration is attained after around five years.



Egyptian vulture in flight



Egyptian vulture on the ground

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PLANTS IN THE DDCR



Ghaf (*Prosopis cineraria*)

Evergreen tree up to 25 m tall; trunk unbranched for several meters; the branches are dropping giving the canopy the round appearance with short triangular spines between leaf nodes; barks are fissured or cracked.

Leaves are grey-green divided into two pinnae each with 7-16 pairs of leaflets with pointed tips. Flowers tiny on cylindrical spikes. Pods cylindrical; slightly curved; yellow to reddish brown. The roots can grow up to 60 m.



Tamarisk (*Tamarix aphylla*)

Evergreen tree up to 10 m, much branched (young branches are smooth). Leaves are tiny and scale-like; wrapped around the stem which give the articulated look. Inflorescences cylindrical and terminal. Flowers pinkish white in colour and tiny. Fruits are bell shaped; seeds have a tuft of fine hairs which assist in wind dispersal.

Found on sand and gravel plains. May occur as planted tree in sandy deserts.



Salam (*Vachellia tortilis*)

Tree up to 12 m, single to several stems, flaky bark, wide and flattened from top crown. Leaves, in pairs of 5-11 pinnae, each with 6-20 pairs of leaflets, paired straight white spines up to 8cm, alternate with shorter (0.5cm) back-curved spines.

Flowers spherical, creamy white on a stalk, flowering April to June. Found in and around gravel plains of Madam.



Sidr (*Ziziphus spina-christi*)

Thorny tree of up to 12 m, trunk very rough, fissured and brown in colour. Crown rounded. Branches with spines, one short and curved, one straight, and round to oval green leaves. Tiny, greenish yellow, sweet scented flowers. Fruits round and fleshy, orange-yellow when ripe and edible, that come on from October to January.



Broom bush (*Leptadenia pyrotechnica*)

Perennial leafless shrub up to 3 m high, milky latex produced when stems or branches broken, branches are smooth, slender and green. Leaves appear only in the early stage of growth and soon fall off. Flowers are small, yellow in colour, fragrant at dusk. Fruits are cylindrical and tapering to a point, sometimes paired, with numerous flat brown seeds, attached to long white hairs. Preferred habitat is sandy plains and low dunes



Arta (*Calligonum comosum*)

Virtually leafless perennial shrub up to 3 m tall. Stem much branched from thick woody rootstock. Twigs slender, dark green that look like long trailing hairs from a distance. Flowers are white with greenish central stripe, no petals, with bright red anthers that appear from December until March. Fruits are showy bristly nuts covered with rusty red or white furry bristles. Common on sand dunes and sandy plains.



Desert thorn (*Lycium shawii*)

Very rigid thorny shrub, up to 3 m high. Leaves are thin, elliptical to a spoon shape with smooth edge, tapering at base, on short stalk. Flowers are solitary, small, “trumpet shaped” variable in colour white, pink to purple that appear from September to April. Fruits are orange, pea sized berries. Common on gravel plains and rocky areas.



Rimth (*Haloxylon salicornicum*)

Large woody plant, much branched, almost leafless shrub up to 150 cm high usually with accumulated sands around the base. Branches bluish-green and fleshy when young, gradually hardening dirty grey in colour. Flowers from September to December. Fruits are winged and ripen to red colour. Common on gravel and sand plains.



Al Ara' (*Aerva javanica*)

Soft wooded bush of up to 1 m high found on gravel plains and disturbed sites. Stem covered in fine hairs with alternate, greyish-green coloured, lance shaped leaves. Flowers throughout the year, except on November and December, with white flowers in spikes.



Sodom's apple (*Caltropis procera*)

The only shrub in the desert with large leaves, covered with white powder to prevent water loss. Part of the milkweed family, it grows up to 5 m tall and has poisonous latex that prevents it from being grazed.



Arabian primrose (*Arnebia hispidissima*)

Common and widespread, it is found on sandy plains between low dunes. Up to 30 cm high, covered with bristly white hairs, branched near the base. Small yellow flowers appear from December to May.



Desert squash (*Citrillus colocynthis*)

Common, found on both gravel and sand habitats, especially on disturbed ground. Green fruit ripens to bright yellow. It spreads over the ground, trailing branches reaching up to 5m length. Fruits are very bitter and will only be eaten by rodents and oryx.



Turnsole (*Heliotropium kotschy*)

Erect shrub, intricately branched, with very rough branches covered with stiff white hairs, grows up to 60cm. Leaves are narrowly pointed, lance-shaped, dark green covered with grey bristles. Flowers are tiny, white and in pyramidal clusters.



Berjan (*Limeum arabicum*)

Perennial shrub up to 80 cm, very thin waxy-white angular stems, branches gently zigzagging at 3-5 cm intervals. Whole plant appears fragile, covered with minute glands to which fine sands cling; at each joint there is a single leaf. Flowers solitary in leaf nodes, petals white and clawed.



Arfaj (*Rhanterium epapposum*)

Perennial shrub, intricately branched up to 70cm high. Leaves are basal, narrowly lance-shaped with serrated edges, and taste peppery. Flower heads are numerous, small, terminal, and yellow.



Dune grass (*Cyperus conglomeratus*)

Variable in aspect from dwarf form with single stem a few cm high to bushy plants with several stems up to 70cm in height. Young growth is pale green but for much of the year the plant is dull brown or straw-like.

Best suited to sand areas, it is one of the few plants that can grow on shifting dunes.



Bristle grass (*Pennistenum divisum*)

Most common grass in the UAE. Tufted and shrubby, it will grow up to 120 cm high. Prefers stable sandy areas.



Plumose triple-awned grass (*Stipagrostis plumosa*)

Tufted perennial grass up to 60cm high, whitish in colour with thin stems. Found on gravel plains and not highly sought after for grazing.