

# Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from [http://www.ramsar.org/ris/key\\_ris\\_index.htm](http://www.ramsar.org/ris/key_ris_index.htm).

*Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8<sup>th</sup> Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9<sup>th</sup> Conference of the Contracting Parties (2005).*

## Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3rd edition). A 4th edition of the Handbook is in preparation and will be available in 2009.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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Designation date

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Site Reference Number

**2. Date this sheet was completed/updated:**

28 February 2011

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**3. Country:**

United Arab Emirates (UAE)

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**4. Name of the Ramsar site:**

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

Wadi Wurayah National Park – متنزه وادي الوريعة الوطني

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**5. Designation of new Ramsar site or update of existing site:**

**This RIS is for** (tick one box only):

- a) Designation of a new Ramsar site ; or  
b) Updated information on an existing Ramsar site
- 

**6. For RIS updates only, changes to the site since its designation or earlier update:**

**a) Site boundary and area**

The Ramsar site boundary and site area are unchanged:

or

**If the site boundary has changed:**

- i) the boundary has been delineated more accurately ; or  
ii) the boundary has been extended ; or  
iii) the boundary has been restricted\*\*

and/or

**If the site area has changed:**

- i) the area has been measured more accurately ; or  
ii) the area has been extended ; or  
iii) the area has been reduced\*\*

\*\* **Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

**b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:**

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**7. Map of site:**

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

- a) A map of the site, with clearly delineated boundaries, is included as: see Appendices A, 1 & 2
- i) a hard copy (required for inclusion of site in the Ramsar List): ;
- ii) an electronic format (e.g. a JPEG or ArcView image) ;
- iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

**b) Describe briefly the type of boundary delineation applied:**

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The boundaries of the area follow the Wadi and its branches' catchment boundaries, and geopolitical boundaries, as well such as the local governments' (Fujairah and Sharjah emirates) jurisdictions. The proposed Ramsar Site is the "Core Zone" located in the current protected area, known as "Wadi Wurayah Mountain Protected Area", and designated as "Wadi Wurayah National Park" in the following document.

**8. Geographical coordinates** (latitude/longitude, in degrees and minutes):

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

WGS 84, Geographical coordinates 25° 24'57.462 N, 56° 15'30.7241 E center of the Ramsar Site

**9. General location:**

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

The site lies within the Emirate of Fujairah on the east coast of the United Arab Emirates at approximately 23km North-West of Fujairah town, 2km South West of Bidiyah village (Fujairah Emirate), 6km North East of Masafi town (Fujairah Emirate), 11km South of Dibba town (Fujairah Emirate) and 5km North-West of Khor Fakkan (Sharjah Emirate) town.

See Appendix A & 1

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**10. Elevation:** (in metres: average and/or maximum & minimum)

The site has a maximum elevation of 956 meters.a.m.s.l above mean sea level

**11. Area:** (in hectares)

The Wadi Wurayah National Park has an area of 12,700ha.

Which include the Ecotourism zone (900 ha) highlighted in green with the core zone 11800 ha which is highlighted in orange and both zones where hatched as the Ramsar Site with a total area 12700 ha .

See Appendix 1

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**12. General overview of the site:**

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland. Wadi Wurayah National Park, in the Emirate of Fujairah, United Arab Emirates, lies within a priority WWF Global 200 Ecoregion (Ecoregion 127, Arabian Highlands and Shrublands), sheltering a rich diversity of rare and endangered mountainous and freshwater habitats and species, and providing opportunities for the sustenance and revival of local livelihoods. The area's characteristic geology has created a unique hydrogeological system in the country that allows run-off water to emerge as springs at contacts between impermeable and permeable rock layers in several wadis. All the nine different freshwater habitat types found here, ranging from riffle and stream to waterfall, are spring-fed with water flows alternating between underground and surface. Over 300 species of plants grow in the area, including the country's unique orchid, *Epipactis veratrifolia*, as well as wetland species. Eleven species of mammals were observed, including the Arabian Tahr (*Hemitrgus Jayakari*), Mountain Gazelle (*Gazella gazelle cora*), Blanford's Fox (*Vulpes Cana*) and, possibly, Arabian leopard (*Panthera Pardus nimr*), all considered threatened by the International Union for Conservation of Nature (IUCN). So far, 73 species of bird (of which 25% are considered of national conservation interest) have been recorded. The Wurayah National Park hosts seventeen reptile and amphibian species of which five are endemic to UAE and northern Oman mountains. Endemic to the Arabian Peninsula and considered threatened by IUCN, the Garra fish, *Garra barreimiae*, is found in Wadi Wurayah National Park. The Wadi Wurayah National Park hosts 74 invertebrate families, including 7 insect species new to science of which 4 are water dependent mayflies (Ephemeroptera). So far, 29 heritage sites have been recorded, including bedu settlements, ancient Islamic graveyards, pre-Islamic tombs and petroglyph (rock carving) site. Social surveys of resident and non-resident local people were conducted showing a positive response to the creation of a protected area.

**13. Ramsar Criteria:**

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

**14. Justification for the application of each Criterion listed in 13 above:**

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

The justification for each Ramsar criterion is listed below.

**Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.**

- The site is unique because it contains a diversity of permanent freshwater ecosystem with springs, streams, pools and waterfalls, which are uncommon in an arid region.

**Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.**

The wetland supports 73 species of birds of which 5% are considered “endangered” worldwide by IUCN and 25 % are of conservation concern for the UAE including: Egyptian Vulture (*Neophron percnopterus*), Lappet faced Vulture (*Torgos tracheliotos*), Lesser Kestrel (*Falco naumanni*), Houbara Bustard (*Chlamydotis macqueeni*) and 3 bird species are considered vulnerable (*Torgos tracheliotos*, *Falco naumanni* and *Chlamydotis macqueeni*). The wetland supports other important species such as vulnerable mammals (*Vulpes cana* and *Gazella gazella cora*) and fish (*Garra barreimiae*), and an endangered mammal (*Gazella gazella cora*)

Species	Scientific name	IUCN Red List	CITES Status	CMS	UAE status
<b>Birds</b>					
Little Bittern	<i>Ixobrychus minutus</i>	LC		II	
Common Teal	<i>Anas crecca</i>	LC		II	
Mallard	<i>Anas platyrhynchos</i>	LC		II	
Egyptian Vulture	<i>Neophron percnopterus</i>	EN	II	I	RT
Griffon Vulture	<i>Gyps fulvus</i>	LC		II	
Lappet faced Vulture	<i>Torgos tracheliotos</i>	VU	II		GTV
Short toed Eagle	<i>Circaetus gallicus</i>	LC		II	
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	LC		II	
Long-legged Buzzard	<i>Buteo rufinus</i>	LC		II	
Bonelli's Eagle	<i>Hieraetus fasciatus</i>	LC	II		ND
Lesser Kestrel	<i>Falco naumanni</i>	VU	II	I	GTV
Lesser Kestrel	<i>Falco tinnunculus</i>	LC		II	
Barbary Falcon	<i>Falco pelegrinoides</i>	LC	I		ND
Sand Partridge	<i>Ammoperdix beyi</i>	LC			RR
Houbara Bustard	<i>Chlamydotis macqueeni</i>	VU	I	II	GTN
Black winged Stilt	<i>Himantopus himantopus</i>	LC		II	RI
Red-wattled Lapwing	<i>Vanellus indicus</i>	LC		II	

Green Sandpiper	<i>Tringa ochropus</i>	LC		II	
Desert Eagle Owl	<i>Bubo ascalaphus</i>	LC	II		ND
Yellow-vented Bulbul	<i>Pycnonotus xanthopygos</i>	LC			RR
Rufous-tailed Wheatear	<i>Oenanthe xanthopygna</i>	LC		II	RR
Hooded Wheatear	<i>Oenanthe monacha</i>	LC		II	RR
Hume's Wheatear	<i>Oenanthe albonigra</i>	LC		II	RR
Rufous –Tailed Rock-Thrush	<i>Monticola saxatilis</i>	LC		II	
Blue Rock Thrush	<i>Monticola solitarius</i>	LC		II	
Upcher's Warbler	<i>Hippolais languida</i>	LC		II	RR
Menetries' Warbler	<i>Sylvia mystacea</i>	LC		II	RR
Desert Lesser Whitethroat	<i>Sylvia minula</i>	LC		II	RR
Plain Leaf Warbler	<i>Phylloscopus neglectus</i>	LC			RR
Arabian Babbler	<i>Turdoides squamiceps</i>	LC			RR
<b>Fish</b>					
Wadi fish	<i>Garra barreimiae</i>	VU			RR
<b>Mammals</b>					
Sind Serotine Bat	<i>Eptesicus nasutus</i>	LC			DD
Blanford's Fox	<i>Vulpes cana</i>	VU			VU
White-tailed Mongoose	<i>Ichneumia albicauda</i>	LR/lc			
Gordon's Wildcat	<i>Felis silvestris gordonii</i>	LC			EN
Caracal Lynx	<i>Caracal caracal schmitzi</i>	LC			VU
Arabian Leopard	<i>Panthera pardus nimr</i>	CR			CR
Arabian Tahr	<i>Hemitragus jayakari</i>	EN			CR
Mountain Gazelle	<i>Gazella gazella cora</i>	VU			VU
Egyptian Spiny Mouse	<i>Acomys cahirinus</i>	LC			NT
<b>Plants</b>					
	<i>Epipactis veratrifolia</i>			II	RR
	<i>Euphorbia larica</i>			II	

**Note**

Significance of the UAE status (Hornby and Aspinall 1996 and Javed 2004): GTN: Globally Threatened (Near Threatened), GTV: Globally Threatened (Vulnerable), GTN: Globally Threatened (Near Threatened) RR: Restricted Range, RI: Regionally Important, ND: Native and Declining, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, DD: Data Deficient.

**Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.**

Wadi Wurayah National Park is one of the last examples of pristine fresh water habitats characteristic, with species which are important for maintaining the biodiversity of the region.

Compared to the UAE fauna and flora, the area hosts ca 44% of the terrestrial plants (ca 300 out of a total of 688), 42% of the terrestrial mammals (20 out of a total 48), 26 % of the terrestrial reptiles (14 out of a total of 53), 17 % of the birds (73 out of a total of 435) and the only two amphibians species recorded for the country. The Wadi Wurayah National Park hosts the only record of the Bloody Darter dragonfly (*Crocothemis sanguinolenta*) for UAE

- **Flora:** orchid (*Epipactis veratrifolia*), and wetland species such as typha;
- **Fish:** wadi fish Omani blind cave fish (*Garra barreimiae*) endemic to the Arabian Peninsula and classified as “*Endangered*” by IUCN;
- **Reptiles:** Bar-tailed Semaphore Gecko (*Pristurus celerrimus*), Rock Semaphore Gecko (*Pristurus rupestris*), Omani Carpet Viper (*Echis omanensis*), Blue-tailed Lizard (*Omanosaura cyanura*): endemic to the UAE and Northern Oman;
- **Amphibians:** Arabian Toad (*Bufo arabicus*): endemic to the UAE and Northern Oman, Dhofar Toad (*Bufo dhufarensis*): endemic to the Arabian Peninsula;
- **Mammals:** Arabian Tahr (*Hemitragus jayakari*), Arabian Leopard (*Panthera pardus nimr*), endemic to the Arabian Peninsula and classified as “*Critically Endangered*” by IUCN; Mountain Gazelle (*Gazella gazella cora*), endemic to the Arabian Peninsula and classified as “*Vulnerable*” by IUCN, and the Blanford’s Fox (*Vulpes cana*).
- **Invertebrates:** 74 terrestrial invertebrate families identified including Odonata (dragonflies), Coleoptera (beetles), Hemiptera (bugs), Odonata (dragonflies), Trichoptera (caddisflies), Platyhelminthes (flatworms), Nematodes (roundworms), Annelids (segmented worms), and Gastropoda (molluscs).

Fourteen reptile and two amphibian species, out of fourteen reptiles 5 are endemic to UAE mountains and northern Oman: Oman Saw-scaled Viper (*Echis omanensis*), Blue-tailed Lizard (*Omanosaura cyanura*), Oman Rock Gecko (*Pristurus celerrimus*), Rock Semaphore Gecko (*Pristurus rupestris*), Arabian Toad *Bufo arabicus*, (*Bufo dhufarensis*) and one introduced species the Red Eared Slider (*Trachemys scripta*).

**Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.**

Due to its habitats diversity and the presence of permanent water, Wadi Wurayah National Park can be considered a stronghold for the invertebrate fauna in UAE. 4 of the 7 new insect species for science are Ephemeroptera (mayflies), which are water-dependent for most of their life as larvae.

**Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.**

As mentioned above, Wadi Wurayah National Park is internationally important for the species as it became officially protected. The site provides habitats for fish, is it also a spawning ground. In the future it could act as a source for reintroductions programs if *Garra* populations tended to disappear elsewhere.

**Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.**

The total world population of Arabian Tahr is estimated at ca 2000 individuals in 1978 (Munton, P.M. 1985). We estimate the population in Wadi Wurayah National Park to be at least 20 individuals (1% Threshold, EWS-WWF Unpublished). This small population is dependent on freshwater for its survival.

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**15. Biogeography** (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

**a) biogeographic region:**

Wadi Wurayah National Park lies within one of the 1,507 ecoregions of the World, WWF identified: the Ecoregion as the Gulf of Oman.

**b) biogeographic regionalisation scheme** (include reference citation):

WWF Ecoregion (see bibliography)

**16. Physical features of the site:**

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

**Geology & Geomorphology:**

The catchment is a geologist's paradise with excellent outcrops of the world renowned Semail Ophiolite suite which generally dominates the hard rock geology. The Ophiolite complex (bedrock) is cut by deeply incised wadis which have subsequently been infilled with fluvial deposits (Figure 6a & 8b). The Upper Cretaceous to Pre-Permian Semail Ophiolite suite comprises mostly gabbros, ultra-basics and fine to coarse grained granite and granodiorite as minor intrusions. The upper parts of the catchment are mostly ultra basics, comprising peridotite, serpentinized peridotite and serpentinite, with locally banded Magnesite. Thin chrysotile and calcite veins are common. Under extreme temperature, the calcite has transformed to marble. The serpentinite is generally highly fractured and rock falls and minor avalanches are seen along contact planes. The lower part of the catchment contains complex zones of gabbro with intermixed ultrabasic rocks. The upper catchment wadis and lower wadi plains comprise wadi gravel deposits. These deposits comprise rounded gravels, cobbles and boulders, usually within a poorly sorted sand/silt matrix. In the vicinity of active wadis, the gravels become increasingly compact with depth. Thick gravel terraces are seen 2-3 km upstream of the Khor Fakkan – Masafi road and continue for a distance of 9-10 km into the catchment. These terraces are very compacted and cemented with a shallow cover of loose boulders, cobbles, gravel and sand. The fluvial deposits are boulders, gravel, sand and silt and occur within the active wadis and in old undifferentiated terrace deposits and cemented wadi walls. The sediments spread out into an outwash fan downstream of the recharge dam.

Structurally, the Shumayliyah mountains are part of a complex anticline system which has been subject to thrusting and overfolding during emplacement of basic igneous crustal rocks. The catchment contains numerous structural lineaments trending mostly NNE-SSW and NW-SW and these structures control wadi directions in the upper catchment. There are three major sets of faults in the region: NW-SE, NE-SW and N-S.

**Climate:**

The whole catchment area is about 129 km<sup>2</sup> in area and has a maximum elevation of 956 m.a.m.s.l. The catchment contains 371 separate streams of 301km total length and the dendritic drainage branches from six main wadis. The climate of the catchment can be described from the nearest comprehensive rain stations at Masafi (9km south west from Wurayah catchment centre). The climate of Wadi Wurayah National Park is characteristic of a hot, hyper-arid mountain desert environment. Temperatures are highest during the period of April to October, and are coolest from November to March. In summer, typical daytime temperatures can reach almost 50°C. The atmospheric relative humidity (RH) varies between less than 1% and 100%. Minimum RH values (< 10%) are recorded mainly during the summer between April and August. Maximum RH values (> 90%) are observed during autumn-winter (September-January) and correspond to night dew formation. According to Boer (1997) the catchment lies in a sub-humid bio-climatic zone and in an area which is the wettest in the UAE. It is not surprising therefore that the perennial waterfalls are unique to Wadi Wurayah National Park. Annual precipitation is however highly variable, as with the rest of the UAE. The majority of rainfall events occur during winter months (October-April) from cloud bands that migrate from the eastern coast of Africa, or from the frontal systems that originate in the Mediterranean when the Siberian high pressure shrinks north-eastwards by late winter, or may be due to the southward advance of active westerly troughs over the south western part of the Arabian Peninsula. Rainfall can occur during summer months with clouds drifting from the Indian monsoon over the Arabian Sea, afternoon convective clouds due to orographic effects, rare cases of the Inter Tropical Convergence Zone shifting northward over UAE and causing overcast weather and thunderstorm activity or the temperature contrast between land and sea (at the hottest time of the year) which may be large enough to produce what's known as a sea breeze front that may give traces of rainfall along the coast. Interestingly, the data for the four closest weather stations surrounding the catchment shows that the rainfall in Wadi Wurayah National Park might be closely linked with the Pacific Decadal Oscillation, or ENSO El Nino and La Nina events. For all El Nino years, the annual rainfall is above average for that year including 1995, the strongest recorded El Nino year, where maxima are reached in Khor Fakkan. Rainfall provides Wadi Wurayah National Park with an average available water of 18.7 Mm<sup>3</sup>/year (million cubic metres per year), from which 2.24 Mm<sup>3</sup>/year occurs as run-off. The area's characteristic geology has created a unique hydrogeological system that allows run-off water to emerge as springs at contacts between impermeable and permeable rock layers in several wadis.

The quality of water is exceptionally good and the hydro-chemical analyses indicate that the spring waters meet, from a chemical point of view, all World Health Organization standards for drinking water and also standards for bottled water. Wurayah waters can be classified as Magnesium Bicarbonate, a type which is indicative of a recently recharged and active water resources regime, slightly alkaline with a mean pH value of 8.3 (range 8.1-9.1). Average laboratory Total Dissolved Solid was 310 mg/l (range: 257-403). Average Dissolved Oxygen varied between 5.2 and 11.22 mg/L. The nitrites average concentration values in Wurayah surface waters of freshwater habitats did not exceed 0.02 mg/L, the nitrates average concentration value being 5.76 mg/L. Mean temperatures in pool habitats ranged from 22 to 28°C owing to their diverse physical nature and location.

#### **Water System:**

Wadi Wurayah National Park rises at an approximate elevation of 900 m.a.m.s.l and continues for about 30 km before it flows out to the Gulf of Oman, some 8 km north of the town of Khorfakkan. The gorge in the Wadi Wurayah National Park is steeply incised and narrow and, at times of flash flooding, becomes a raging torrent for a period of hours and has the potential to cause serious flood damage downstream. The flash flooding results in tremendous in-wadi erosion with the subsequent removal and re-deposition of large volumes of gravel. Exposed borehole casing of Ministry of Environment and Water (MoEW) well in the wadi shown would originally have been completed just ½m above ground level – proving 2-3 m of gravel removal since the well was drilled sometime in the 1980's.

The major tributaries in the catchment are Wadi Aqabah, Wadi Ghushaymah, Wadi Ghyal and Wadi Ghaililat Al Khun. The total catchment area is 129 km<sup>2</sup> and the total length of wadis is 301 km, giving a very high drainage density of 2.3. The drainage type is complex. The wadi flood plain commences at the Jebal foot, comprising boulders, cobbles, gravel and sand of various dimensions, deposited in that order as flow velocities reduce. Downstream of the gravel plain lies the coastal zone with an elevation of < 20 m.a.m.s.l comprising beach sand of 4-5 km width.

The mean annual rainfall in the catchment down to the MoEW's gauging station, just upstream of the confluence of Wadi Al Wurayah and Wadi Ghalilat Al Khun is calculated as 145 mm (W.S. Atkins, 1993). The run-off coefficient for the catchment is 12 % and annual flows measured between 1981 and 1992 at the MAF wadi gauge range from 0 to 6.3 Mm<sup>3</sup>/yr, with a mean of 1.6 Mm<sup>3</sup>/yr. Wadi flows are limited to the months February through May, November and December. Daily flood volumes reached a maximum of 5.4 Mm<sup>3</sup>/yr in 1983. The return period for this flood is calculated as 20.33 yrs, in other words, this massive daily flood can be expected to occur once in every 20 years, whilst a daily flood of 92,330 m<sup>3</sup> can be expected every year. These data were used to site and design the Al Wurayah recharge dam.

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#### **17. Physical features of the catchment area:**

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

See above (16)

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#### **18. Hydrological values:**

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Wadi Wurayah National Park is important for seasonal water retention for wetlands or other areas of conservation importance downstream. It is important for the recharge of aquifers, and has a major role in maintaining high water quality standards.

##### **1) Water Sources and Aquifers**

The high elevations in the catchment provide for substantial rainfall which is enhanced by orographic effects. Mean annual rainfall in the catchment is 145 mm which equates to an annual water availability of 18.7 Mm<sup>3</sup>/yr and a surface run-off of 2.24 Mm<sup>3</sup>/yr.

There are two types of aquifer present in the catchment: Semail Ophiolite and Alluvium/Quaternary gravels.

**Ophiolite:** The ophiolite suite comprises igneous and ultra basic rocks which form the bedrock (base) to the aquifer systems and are themselves not considered as a productive aquifer. For the most part of the catchment, the bedrock is covered by a thin veneer of gravels. Primary permeability of the bedrock is negligible, although fractures and cavities do provide for some secondary permeability and some opportunity for groundwater storage. It is accepted that localized groundwater flow can occur within the bedrock but it is considered that this is not significant regionally.



**Alluvium:** Wadi deposits comprise both recent and old, quaternary gravels which contain boulders, cobbles, pebbles, sands and gravels, of varying content and with varying degrees of cementation and compaction. Generally, the formation takes on the appearance of a moderately cemented conglomerate and is the predominant aquifer in the catchment. The thickness of the alluvium aquifer varies from a few meters within the narrow stream valleys in the upper reaches to 20-40 m within the middle and lower reaches. At about 3km from the coastline, it is reported that the bedrock shelves steeply and alluvium thickness reaches 90m or more. Data from 47 boreholes inventoried earlier (W.S. Atkins, 1993) shows depth to bedrock varying from 6.6 m to 96 m below surface and the water table at depths between 3.68 m and 51.52 m below ground. The permeability of the gravel aquifer has been tested at between 0.1 m/d and 163.3 m/d but the recharge rate used for the design of the main dam was 5 m/d. Transmissivity of the gravel aquifer is very variable (18.3 m<sup>2</sup>/d to 615 m<sup>2</sup>/d), dependent on degree of cementation, as is the storativity, but the effective storage of the wadi deposit is calculated at between 5 % and 15 %.

## 2) Surface water and Groundwater Flow

**Surface Water:** Rainfall provides low salinity and low temperature run off which infiltrates the fractured ophiolite and the recent and older wadi gravel and gravel terraces in the upper parts of the catchment. Run-off quickly finds its way downstream in flash floods which also provide significant recharge to the alluvial aquifer in the mid part of the catchment, ultimately culminating in storage for the Al Wurayyah recharge dam. Undulations within the impermeable igneous bedrock are filled with shallow alluvium. Upstream of the contact spring waterfall, springs bring water to surface both at the contact between bedrock and alluvium and also at the contact between cemented and uncemented gravels the former acting as impermeable barriers forcing water into the wadi channels. Fractures within the cemented gravels also produce springs. Combined flows from contact springs near the contact spring waterfall were approximately 2-3 l/s at time of visit. Downstream of the contact spring waterfall, surface water occurs as continuous streams above saturated gravels. The streams are choked with *Phragmites australis* (common reeds) and the clear pools have numerous wadi fish. The main and contact spring waterfalls which have current flows of about 40 l/s and 15 l/s respectively. In 1994, flows recorded were 45 l/s and 17 l/s respectively. The main waterfall and associated pool is a very popular picnic spot at weekends.

**Groundwater:** Groundwater flows within the alluvium aquifer in a north easterly direction within the wadi plain towards Wadi Azir and out to the coast. Groundwater levels in the seven MoEW observation wells vary between 9 m and 53 m below ground level in December 2005. Groundwater levels in the dry, upper catchment narrow wadis are just below surface. The wells are numbered in sequence from west to east and were drilled at the same time as completion of the Al Wurayyah recharge dam. Wells WUR-1 & 2 are located upstream of the dam, the remainder downstream. All wells, except WUR-7, located 1 km from the coast, show a general decline in groundwater levels. Years 1995 -1997 all had more than double the average annual rainfall, causing many flood events and in 1998 groundwater levels were at their highest ever recorded. Since then, the long term trend has been for levels to fall, but those wells in or near the active channels, do respond instantaneously to wadi flow events, with well water levels increasing by up to as much as 30 m, as was the case in WUR-2 & 4 in early 2005. However, these wells have shown a general groundwater decline over the last nine years of 26 m and 24 m respectively. Groundwater levels once again recovered during the high annual rainfall events of 2006-2007 and 2009. Groundwater gradients in the upper wadi area are steep and range between 0.0123 and 0.0166. The sectional groundwater through-flow in the vicinity of MoEW's well WUR-4 varies between 0.1 and 1.5 Mm<sup>3</sup>/yr, depending upon applied permeability and depth of groundwater flow. The groundwater flow patterns appear to undergo a major change approximately 3 km from the coast where gradients are very flat and the groundwater level is very close to sea level (see record for well WUR-7 and WUR-6). Groundwater development in the coastal area will therefore always be susceptible to sea-water intrusion if abstractions are excessive. It is estimated that groundwater recharge in the catchment is between 1-5 to 2.5 Mm<sup>3</sup>/yr, suggesting that approximately 15 % of the total catchment annual precipitation is converted to surface runoff and groundwater through-flow.

## 19. Wetland Types

### a) presence:

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

**Marine/coastal:** A • B • C • D • E • F • G • H • I • J • K • Zk(a)

**Inland:** L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va  
Vt • W • Xf • Xp • Y • Zg • Zk(b)

**Human-made:** 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

### b) dominance:

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

M -- **Permanent streams**; including waterfalls.

N -- **Seasonal/intermittent/irregular streams** created by rainfall

Tp -- **Permanent freshwater marshes/pools and ponds (below 8 ha)**, marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season

Ts -- **Seasonal/intermittent freshwater marshes/pools (below 8 ha)**, on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

Y -- **Freshwater springs and oases.**

6.-- There is a retention dam that is filled only occasionally by sporadic rainfalls.

## 20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

Wadi Wurayah National Park hosts a unique ecosystem in the UAE of perennial freshwater habitats, in the form of succession of springs, pools, riffles/streams and waterfalls. This ecosystem supports a rich biodiversity of fauna and flora in an area of outstanding natural beauty which is already an established popular tourist attraction. The water reserves of the wadi catchment provide freshwater resources and a run-off of 2.24 Mm<sup>3</sup>/year for the downstream area (see 16,17, 18 above).

Until 1981, when the last local family left the area, the area has been extensively used for centuries by locals because of the presence of permanent freshwater and wildlife (plants and animals) associated. Families and bedouin tribes used to spend cooler months in the mountains with their livestock, and hotter months by the coast fishing and cultivating. However until now, locals venture in the area to collect medicinal plants, wild honey and fodder for livestock. The permanent water running underground provides down-stream a continuous source of freshwater for farms and a local bottle factory.

## 21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Wadi Wurayah National Park hosts about 300 plant species. The most prevalent plants species are the woody perennial, namely *Convolvulus virgatus*, *Lycium shawii*, *Boerbarvia elegans* and *Heliotropium spp.* Major trees identified were *Acacia tortilis*, *Moringa peregrina*, *Ficus cordata* and *Ziziphus spina-christi*. The characteristic flora of higher elevation plateaus and slopes are *Acacia tortilis*, *Lycium shawii*, in combination with several woody perennials such as *Euphorbia larica* and *Tephrosia appolinea*, this constitutes a common plant association. There were no aquatic macrophytes recorded throughout the entire survey, the only aquatic vegetation present was algae ranging from thin films of epilithic algae growing on rocks and gravel to fine filamentous, green algal species in the riffles and floating mats of brown algae in the static pool environments. However, Wadi Wurayah National Park is characteristic for its vegetation associated with the presence of temporary and/or permanent fresh water sources: *Arundo donax* named "Warrah" and the

Wadi was named in regards of it "Wadi Wurayah". *Typha domingensis*, which considered unpopular and rare plant in UAE. *Nerium oleander*, *Saccharum ravennae* and the orchid *Epipactis veratrifolia*, in association with the fern *Onychium divaricatum*. The orchid species is of particular interest, being the unique Orchidaceae found in the United Arab Emirates. It is worthy to mention that *Tamarix aphylla*, *Moringa peregrina*, *Typha domingensis* are considered uncommon/rare in UAE. Abandoned date palms (*Phoenix dactylifera*) are located in the lowest wadi elevations, as signs of old nearby settlements. Finally, an established oasis down stream of the Wadi Wurayah National Park catchment area constitutes areas of intensive cultivation of economically important crops: dates, mangoes, guavas, bananas, citrus, vegetables and a number of forage crops.

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## 22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

A total of 20 observed or suspected species of mammals in the region were recorded. Of these, 20% are considered Threatened worldwide by the IUCN and 33% are of conservation concern locally such as the Arabian Tahr (*Hemitryx jayakari*), the Mountain Gazelle (*Gazella gazelle cora*), the Caracal Lynx (*Caracal caracal schmitzi*), the Blanford's fox (*Vulpes cana*) and possibly the Arabian Leopard (*Panthera pardus nimr*). The Wadi Wurayah National Park is already one of the last 3 remaining strongholds of the Arabian Tahr in the world.

Seventy-three species of birds in total have been recorded within the Wadi Wurayah National Park region, adding 9 new species to the 2006 survey and 19 in total to the list compiled from previous authors' observations. Of these 73 species of birds, 5% are considered endangered worldwide by the IUCN and 25 % are of conservation concern for the UAE. See Appendix 5 . Common Birds Species of Wadi Wurayah National Park

A total of 74 terrestrial invertebrate families have been identified so far, belonging to 12 different orders of which the aquatic invertebrates: Coleoptera (beetles), Hemiptera (bugs), Odonata (dragonflies), Trichoptera (caddisflies), Platyhelminthes (flatworms), Nematodes (roundworms), Annelids (segmented worms), and Gastropoda (molluscs). So far, 7 new species for science have been discovered in Wadi Wurayah National Park. Four of these new species are Ephemeroptera (mayflies), which are water-dependent for most of their life as larvae and are very pollution sensitive, being indicator of good-water quality worldwide. *Garra barreimiae* is the only fish species present in Wadi Wurayah National Park. Because of the aridity of the region, and because Wadi Wurayah National Park is hosting noteworthy wildlife species that have a biodiversity, medicinal and cultural interest. Because of the development of the country and the use of mountain raw material for construction, the mountain habitat has been heavily impacted and fragmented by road works and crushing and quarry sites. Wadi Wurayah is the last intact catchment basin in the Eastern part of the country. Therefore, it is of national and international importance as a refuge for a lot of endangered and rare species.

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## 23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

### 1) Archaeological significance

The Fujairah Emirate is very rich in archaeological and historical sites of national and international importance. Prehistoric burials were found and excavated in Wadi Saqamqam, north of Fujairah town, and important petroglyph sites were described south-southwest Fujairah town (Wadi Al-Hayl, Wadi Saham, Wadi ah-Shanah), southwest Dibba (Hassat al-Risoom) and Dadnah. Old settlements from the Third Millennium BC (-3000 BC) were found in the vicinity of the Wadi Wurayah National Park on the northern edge of the Shimayliyyah Mountains and in Bidiyah (stone-walled buildings). Long collective graves from the Second Millennium BC (-2000 BC) have been excavated in Bidiyah were discovered in Bidiyah. A number of sites from the Iron Age (1,300-500BC) were identified near Wadi Wurayah National Park in the mountains (Bithna, Wadi Asimah, and Wadi Awhalla) and on the coast (Dibba and

Qidfa). The most ancient mosque of the UAE dating from 1446 AD is located in Bidiyah. Forts dating from 16th to 19th century can be found in Fujairah, Bithnah, Al Hayl and Awhala. So far, 29 heritage sites including old settlements, Islamic graveyards, pre-Islamic tombs and petroglyphs (rock carving) site were identified in the Wadi Wurayah National Park catchment basin. Porcelain and pottery fragments from 15th to 18th centuries AD were also found. Two cairn sites were also discovered in the north part of the surveyed area and their significance remains to be verified. The two pre-Islamic tombs, some of them similar to examples found all over the East Coast (including the Wadi Saqamqam graves), on the plain of Kalba (60 something graves) seem to be of a Late Pre-Islamic date (*ie* post 300 BC to ca 6th cent AD). However, since an extensive settlement continued without interruption for several thousand years until recent times (according to locals, the last bedu family to camp during winter in Wadi Wurayah National Park left the area in 1981), it is difficult to date the sites discovered in Wadi Wurayah National Park area with precision without further archaeological investigations and proper excavations.

## 2) Agriculture

Until the 1970s, like most of the areas of the Hajar Mountains, goats were the main domestic livestock used for milk, meat and skins. Donkeys were used as beast of burden until the availability of four-wheel drive vehicles. Within the Wadi Wurayah National Park catchment basin, there are no more goat camps, even during the winter; their presence stopped in 1981. Nevertheless, goat presence (tracks, faeces or sightings) was recorded in all of the Wadi Wurayah National Park area surveyed. Goats observed in Wadi Wurayah National Park are now feral and are not owned by anyone. Even though the area had some permanent settlements in the past, the majority of its residents used to migrate between the mountain area and the coastal area where they were spending the hottest season (April-October) trading, looking after their palm plantations, and fishing. Presence of permanent water resources in Wadi Wurayah National Park has allowed a light variety of agriculture (mostly date palm cultivation), as the presence of abandoned oases within the surveyed area shows. The agricultural activities (mostly dates, mango (*Mangifera sp.*) and Citrus sp. trees) are nowadays concentrated in the down-stream part of the wadi, near the coast. Nevertheless, Wadi Wurayah National Park has been, and continues to be, used by local inhabitants from Masafi and Bidiyah for wild honey gathering. Starting in May, honey gatherers search for wild honey comb from wild bees (*Apis florea*) in crevices and caves that they will collect in autumn. The quality of honey is said to be exceptionally good. This honey is therefore not sold in the open market, as the gatherers and purchasers know each other and deals are done in private. Honey gatherers have generally their production sold even before collection. Some of this production is given to dignitaries rather than sold. The local honey gathering corporation is ruled by ancestral codes such as “the first person to find a honey comb in spring marks the site with his proper sign or code (stone pile, rock carving, and/or branches) and nobody touches it”. Locals complain that foreigners do not respect these rules. Due to the high revenues provided by the wild honey sale (ca 150 USD for a 75cl bottle), this activity generates a lot of interest and, according to locals, has become more intensive during the years with the competition of foreigners and the accessibility to the site due to a tarmac road that leads to the waterfall. Honey gatherers represent only 5.3% of the local people interviewed during the social survey.

## 3) Water extraction

Compared to other parts of the country, there is little ground water extraction within Wadi Wurayah National Park. Water resources development within the catchment is currently restricted to the down stream part of the catchment basin for agriculture, and municipal well fields supplying the main towns of Khor Fakkan and Bidiyah and a bottled water factory (Emirates Pure Spring Water Company) who abstract groundwater in the coastal plain near Bidiyah. However, because of gravity and topography, any deterioration of the general water situation in the lower catchment and coastal plain can never have a hydrological impact on either the surface or groundwater resources of the mid-upper catchment. A small dam has been constructed upstream of the main waterfall to divert surface flow into a 3 m diameter concrete caisson which then feeds by gravity into a 10-inch HDPE pipeline down wadi to the area of agriculture. However, the system installed some 15-20 years ago and destroyed by the successive flooding is now abandoned. Some 114 recharge dams have been constructed in the Northern Emirates since the 1980's, with a combined capacity of 114 Mm<sup>3</sup>. The dams serve the dual purpose of preventing downstream flooding (often causing severe damage to roads, buildings etc. and also interruptions to road traffic) and enhancing the recharge to aquifers by storing the runoff so that it can be gradually released downstream for maximum recharge effectiveness. A dam was constructed in 1997 in the lower part of Wadi Al Wurayah and is one of the largest dams built in the region. From 1997 to 2005, a total of nearly 9 Mm<sup>3</sup> was captured from flood events. Downstream, there are three breaker dam walls to capture the main dam overflows, at 2.5 km, 8 km and 10.5 km downstream of the main dam. Both the downstream agricultural development and the domestic municipal well fields supplying Khor Fakkan and Bidiyah have benefited from the dam and breakers. Observation wells were drilled by the UAE Ministry of

Environment and Water at the same time as completion of the Al Wurayah recharge dam to monitor the groundwater levels.

#### 4) Tourism

Until now, despite its popular attraction, there are no tourism facilities in Wadi Wurayah National Park. Locals, residents and tourists visit Wurayah for its permanent waterfalls and the beauty of the scenery, mostly during the week-end for a daily visit or an evening picnic. The access has been considerably facilitated during the last 10 years by the construction of a tarmac road in 1996 that leads to the dam and the main waterfall. The tarmac road ends with a parking lot situated above the main waterfall and tourists can climb down to the waterfall.

**b)** Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box  and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

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#### 24. Land tenure/ownership:

a) within the Ramsar site:

The land is owned by the ruler of Fujairah Emirate and the local tribes and families.

b) in the surrounding area:

The land is owned by the ruler of Fujairah Emirate and the local tribes and families.

Farms downstream belong to the ruling family of Abu Dhabi. Part of the catchment area is located in the Sharjah Emirate.

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#### 25. Current land (including water) use:

a) within the Ramsar site:

See 23 above.

Despite the abandonment of traditional seasonal herding of livestock (goats) in the Wadi Wurayah National Park catchment basin, social survey revealed a still strong relation between residents and the area. Sixty-six percent of the interviewed men visit Wadi Wurayah National Park at least once a month. These are mostly daily visits (93%) to enjoy the scenery and water. 13% of the interviewed admitted to go for hunting and/or collecting honey in the area.

b) in the surroundings/catchment:

The groundwater is exploited by a bottled water factory (Emirates Pure Spring Water Company) who abstract it in the coastal plain near Bidiyah

Farms also abstract groundwater in the downstream floodplain.

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**26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

a) within the Ramsar site:

**1) Overgrazing**

The Wadi Wurayah National Park area is no longer exploited by goat herders. Since the 1990s, they keep their herds in fenced farms where they can be supplied better quality food at lower costs. However, there are still remnant populations of domestic goats and donkeys which have become feral over time. These feral species can pose problems to the freshwater environments; goats frequently defecate in water bodies, increasing ammonia and nitrate levels, and coliforms pollution (Knuteson 2008). Goats graze vegetation indiscriminately, unlike the more selective Mountain Gazelle and Arabian Tahr. As a result certain plant species decrease which may be important food sources for native wildlife. Combined with drought and the disappearance of the potential predators (Arabian Leopard, Caracal) due to human persecution, grazing by domestic and feral livestock threatens the native vegetation. Should this combination of stresses on the environment continue, the vegetation may not recover, ultimately leading to the total extirpation of the native flora, and the disappearance of the endemic herbivore fauna (Arabian Thar, Mountain Gazelle, gerbils, birds, insects) and their predators (Arabian Leopard, Caracal, Blanford's Fox, Gordon's Wild Cat, raptors, etc.) linked to it. Despite their impact on the vegetation, feral goats are however now become part of the diet of the Arabian Leopards and Caracals, as observed. Feral goat populations might have reached an equilibrium in relation with predators, climate and water availability. However, the decline of predators due to human persecution might have allowed the population of feral goats to increase and the problem of overgrazing to arise. Feral donkeys in Wadi Wurayah National Park are not considered a threat since their number is low (estimated to less than 5 individuals) and concentrate in the lower parts of the surveyed area.

**2) Water overexploitation**

Historically, UAE's water requirements were met solely from groundwater obtained from shallow hand dug wells and in the mountainous areas: the traditional "falaj" system, man-made channels used to collect groundwater, spring water and surface water and transport it, by gravity, to a demand area. Over the last 30 years, however, rapid economic development, coupled with sharp population increases and the development of large agricultural and forestry sectors, substantially supported from Government subsidies, has meant an increasing pressure on the existing water resources. In Al Ain region, Abu Dhabi Emirate, a groundwater level loss of 61 to 93m in 10 years has been observed (Brook et al., 2006). In mountainous areas, the falaj system has been replaced by the construction of dams. Groundwater extraction within the vicinity of plantations also cause die-off of natural vegetation in lower lying areas and the intrusion of sea-salt water in the table results in the salinisation of water resources and soils. However, as mentioned above, because of the topography, the deterioration of the water situation in the lower catchment and coastal plain of Wadi Wurayah National Park can never have an hydrological impact on the surface and groundwater resources of the mid-upper catchment. Therefore the perennial surface waters of Wadi Wurayah National Park, which make it a unique place in the UAE with a rich and varied biodiversity, are safeguarded against any over-exploitation of water resources in the lower parts of the same catchment. Dam reservoirs may controversially provide additional habitats that may be colonized by aquatic vegetation, invertebrates, amphibians, fish, etc. As an example, Rufaysah dam of Wadi Shi in the south of our study area, near Kohr Fakkan (Sharjah Emirate), became one of the wetlands of international importance in UAE and is one of the few breeding sites in the UAE for the Little Grebe (*Tachybaptus ruficollis*). It is also a hosting site for migrating and wintering birds. It is also believed to attract Wadi Wurayah National Park wildlife that crosses mountain passes to come to drink. However, in arid lands, permanent water pools are a local tourist attraction and are heavily frequented during week-ends. As a result, the sites are often degraded with litter deposits, fires and vehicle tracks. Most of the reservoirs such as Wurayah, in the region are dry and construction involved in dam production has had a heavy impact on habitats and wildlife, due to the process of taking material for the dams and accessing roads which cause disturbance by people and vehicles in the area.

**3) Mining**

In 2005, there were 64 crushers in the Fujairah Emirate alone, representing 40% of the labour force and income of the emirate (Fujairah Statistics Yearbook, 2006). Crushing and quarries for mineral extraction not only mean an irreversible loss of habitat, but also induces a supplementary stress to the remnant arid mountain fragile wildlife populations, weakened by natural causes (drought), overhunting in the past, poaching, water extraction for agriculture, habitat fragmentation with development, interspecific competition with livestock and feral goats for food and water. So far, Wadi Wurayah National Park has

been spared by the mining activities. However, abandoned quarries at the parking lot above the main waterfall and in Wadi Shi to the south and Wadi Zikt to the north of the area show that the region was prospected for construction material production. If planned, the development of crushers, the construction of infrastructure (buildings, roads, etc.) and the nuisance (traffic, dust, noise) associated with it, will have a severe and irremediable impact on the site.

#### **4) Habitat fragmentation and urbanisation**

Agricultural and urbanised lands into the eastern part-downstream of Wadi Wurayah National Park have been extending. A road is currently being built south of the catchment basin between Khor Fakkan and Masafi. However, the impact on the pristine habitat upstream is until now negligible, with the exception of the incursion of Feral Cats (*Felis catus*) and Feral Dogs (*Canis canis*) from the suburbs of Bidiyah town, and the trapping/poisoning of wild carnivores that are attracted by domestic livestock and garbage. A large scale development project with permanent settlement and the construction of infrastructure associated with it (buildings, roads, etc.) within the catchment basin has been proposed and was fortunately abandoned.

This would have had a severe impact on the site, the beauty of the scenery, and certainly the integrity of this environment. A secondary consequence of permanent development will be the continuous presence of people at the site, the risk of more rubbish and pollution deposited and the attraction of feral animals (goats, dogs and cats).

#### **5) Wildlife poaching and persecution**

Despite the UAE Federal Law No 24 of 1999 updated in 2006, hunting and poaching still occur in Wadi Wurayah National Park area. However, exact figures are difficult to assess. On the basis of our social survey, official declared hunters were only 12 (= 8 % of the people interviewed) of which only two men admitted to still hunt today (mostly feral goats, Arabian Tahr, Mountain Gazelle, Sand Partridge). Honey collectors may often carry a gun and at the occasion, shoot what they encounter. Bidiyah residents accuse Masafi residents, and vice versa, to come to poach tahrs and gazelles in Wadi Wurayah National Park. Hunting and poaching by non-residents is suspected also. Hunting activity is higher during late spring and summer which is the period when wildlife visit the permanent water sources and is more predictable and vulnerable. Because of their potential threat to domestic livestock, caracals, foxes and the elusive Arabian leopard are subject to persecution in the whole region and still trapped, poisoned or shot. A Bonelli Eagle with strings was observed in the study area. According to falconers, local Asian workers expect to ameliorate their revenue by trapping any raptor species and trying to sell them to local falconers. Since the species is not favourable for falconry, the Bonelli Eagle was probably mistaken for a falcon, refused by the falconer and released by the trapper who could not sell it. The local decree # 2 of 2009 declaring the Wadi Wurayah National Park mentions explicitly hunting of wild animals as illegal.

#### **6) Habitat degradation**

As a consequence of the construction of the tarmac road in 1996 and the citation of the site in UAE tourist and off-road guides, the site has increasingly gained considerable recognition and has therefore been considerably degraded with tagging (painting) of the rocks, continuous and widespread litter deposits and burning of native vegetation during the last couple of years. A large input of organic items of rubbish, including food and sewage, can increase nitrates and phosphates in the water therefore increasing algae and leading to eutrophic conditions, a decrease in Dissolved Oxygen and the extirpation of the unique aquatic fauna. Knuteson (2008) showed that the wadis waters in the region have been infected by the colliformes from animal faeces origin but also *Escherichia coli* from human faeces origin. Recent samplings in Wadi Wurayah National Park show also the presence of these bacteriae in the pools visited by tourists. Litter deposit and left-over by tourists also attracts and allows the colonisation and survival of feral animals such as goats, donkeys, cats and dogs, and Red Foxes as well, that compete with or predate on indigenous wildlife. Graffiti is prevalent around the main waterfall pool, although this is predominantly an aesthetic problem; the aerosol paints used are toxic and usually discarded in the area when empty. Despite the heavy tourist pressure on the site, few people overnight or go beyond the two spots that can be reached by four wheel drives, due to the strong fear of snakes. Honey collectors and hunters frequently put fire to the vegetation in the wadi, either to clear and facilitate the access or to kill snakes. This activity is considerably prejudicial to the natural flora and fauna but also the beauty and scenery.

## 7) Introduced species

In spring 2007, a Green Aloe (*Furcraea foetida*) was spotted in Wadi Wurayah National Park. Originally from South America, the Green Aloe was introduced as an ornamental and for its fibre in several islands of the Indian and Pacific Ocean. Because its inflorescences produce bulblets in large quantities that disperse naturally and form dense impenetrable stands which exclude native vegetation, this plant is a serious threat for the ecosystems out of its native range (<http://www.issg.org>).

In November 2007, a Red-eared Slider turtle, (*Trachemys scripta*), originated from the New World, has been discovered in a pool of Wadi Wurayah National Park. The faeces analysis of the Red-eared Slider in-situ revealed the presence of wadifish, aquatic invertebrates including molluscs, and algae. Because of its aggressiveness and outcompeting with natives turtles species, its impact on the native fauna and flora and being a vector of diseases, especially *Salmonella sp.*, to the native fauna and humans, the Red-eared Slider has been nominated as one of the 100 "World's Worst" invaders by the Invasive Species Specialist Group of the IUCN; (<http://www.issg.org/database>).

Alien fish such as Mozambique Tilapia (*Oreochromis mossambicus*), and Koi Carps, an ornamental domesticated variety of the Common Carp (*Cyprinus carpio*), have been observed in the same pool. Tilapias and the Common Carp and its various forms are considered as among 100 of the "World's Worst" invaders by the Invasive Species Specialist Group of the World Conservation Union (IUCN; <http://www.issg.org/database>).

Feral cats (*Felis cattus*) and dogs (*Canis canis*) constitute also a constant pressure on the Wadi Wurayah National Park ecosystems.

Introduced and highly invasive Ring-necked Parakeet (*Psittacula krameri*), Common Mynah (*Acridotheres tristis*), House Crow (*Corvus splendens*) are observed downstream near farms.

## 8) Military manoeuvres

Military training occurs in the southern border of the Wadi Wurayah National Park. Military unites manoeuvring activities occur except hence there is direct physical disturbance from live-firing exercises, i.e. smoke, flares, explosions and the noise associated with them which can disturb wildlife. In the vicinity of Bidiyah, the activity occurs currently inside the camp area and outside of the main interest area and therefore it poses no immediate threat to the protected area. Indeed, because of the proximity to the military areas, it is quite possible that large-scale infrastructure development would not be allowed to take place and human incursions would be limited as a result of military security requirements.

b) in the surrounding area:

Increase of development on the coast will induce an increase of population and the demand for building materials therefore a risk of increase for demand in freshwater, the expansion of crushers/quarries and the increase of tourists in the wadi.

## 27. Conservation measures taken:

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

The local decree # 2 of 2009 for declaring Wadi Wurayah as protected area was signed on 16 March 2009. The decree mentions the protection of Wadi Wurayah, Wadi Zikt and Wadi Maqsad and Swaideiyah catchment basins.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

In process



d) Describe any other current management practices:

Regular cleaning of the touristy area by Fujairah Municipality-Dibba Branch.  
Continuous fauna and flora monitoring by EWS-WWF.

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**28. Conservation measures proposed but not yet implemented:**

e.g. management plan in preparation; official proposal as a legally protected area, etc.

The Wadi Wurayah National Park would have the following main objectives:

- (1) To protect the ecological integrity of the freshwater ecosystem for present and future generations,
- (2) To exclude exploitation or occupation unfriendly to the purposes of designation of the area,
- (3) To provide a foundation for scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

To reach the objectives of the Wadi Wurayah National Park, a Management Plan was drafted with the following main objectives:

- (1) To ensure the protection of the Wurayah freshwater catchment area of national and international significance for scientific, educational, recreational or tourist purposes,
  - (2) To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity,
  - (3) To manage visitor use for educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state,
  - (4) To eliminate and thereafter prevent exploitations or occupations incompatible with the purposes of the designation of the Protected Area,
  - (5) To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation of the Protected Area,
  - (6) To take into account the needs of local people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management
- 

**29. Current scientific research and facilities:**

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Since 2005 a 3-years monitoring, survey, education, and public awareness project has been on-going by EWS-WWF and Fujairah Municipality.

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**30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:**

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

Volunteers and school trips regularly organised by EWS-WWF.

Visitor/education centre is in progress for the Protected Area.

Social surveys were conducted in the Bidiyah tribe and revealed that 67% of the local people interviewed were in favour of the idea of a Protected Area in Wadi Wurayah.

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**31. Current recreation and tourism:**

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

See 23 above.

Sixty-six percent of the interviewed local men visit Wadi Wurayah National Park at least once a month. These are mostly daily visits (93%) to enjoy the scenery and water.

With an easy access due to an asphalt road, the wadi is heavily frequented by tourists and residents especially on the week-ends between October and April.

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**32. Jurisdiction:**

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

The Wadi Wurayah National Park is under the jurisdiction of the Municipality of the Fujairah Emirate. The UAE Ministry of Environment and Water is in charge of the monitoring of the groundwater, and the application of the Federal Laws for environment protection.

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### 33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

The Environment Protection and Development Department of Fujairah Municipality is in charge of the protection of the environment. The head of the Department is Engineer Ali Qasem. The Fujairah Municipality –Dibba branch is in charge of the cleaning of the area. And here is contact details for

Environment protection and development department of Fujairah Municipality :  
Fujairah Municipality  
Environment Protection and Development Department,  
Tel:+971 9 2028234  
Fax :+971 9 2222231  
P.O.Box 7 Fujairah - United Arab of Emirates  
e-mail : [enviro@fujairahmunc.gov.ae](mailto:enviro@fujairahmunc.gov.ae)

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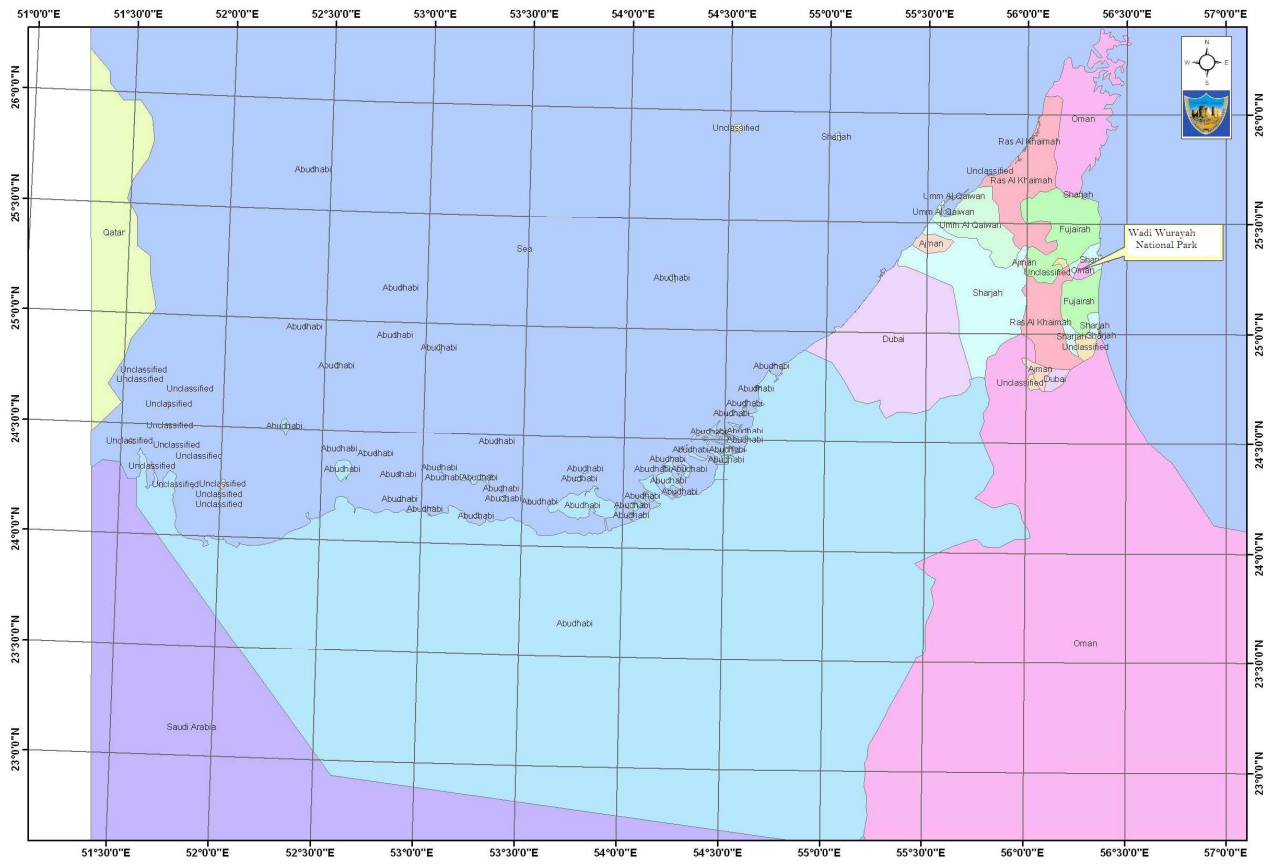
### 34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

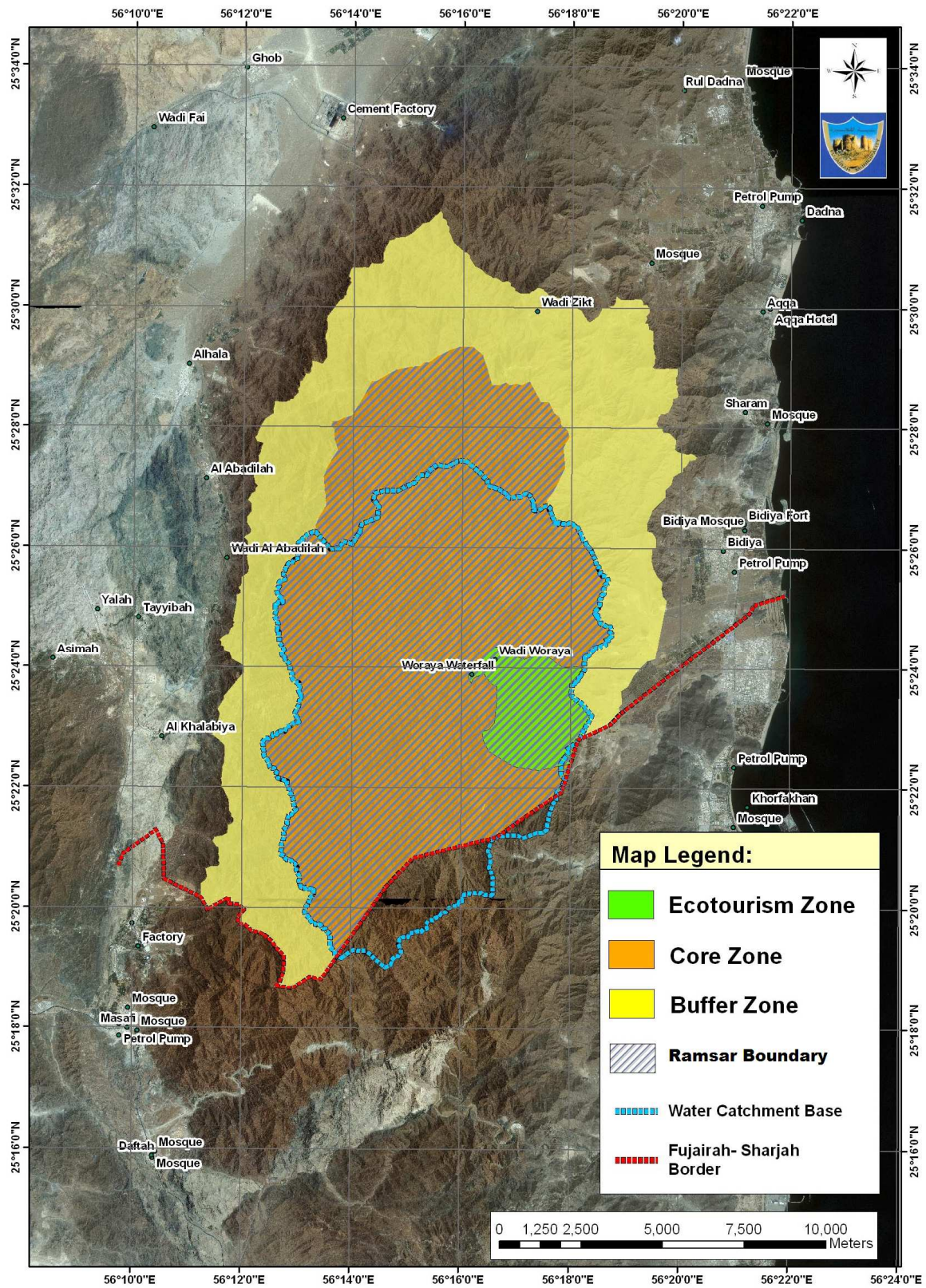
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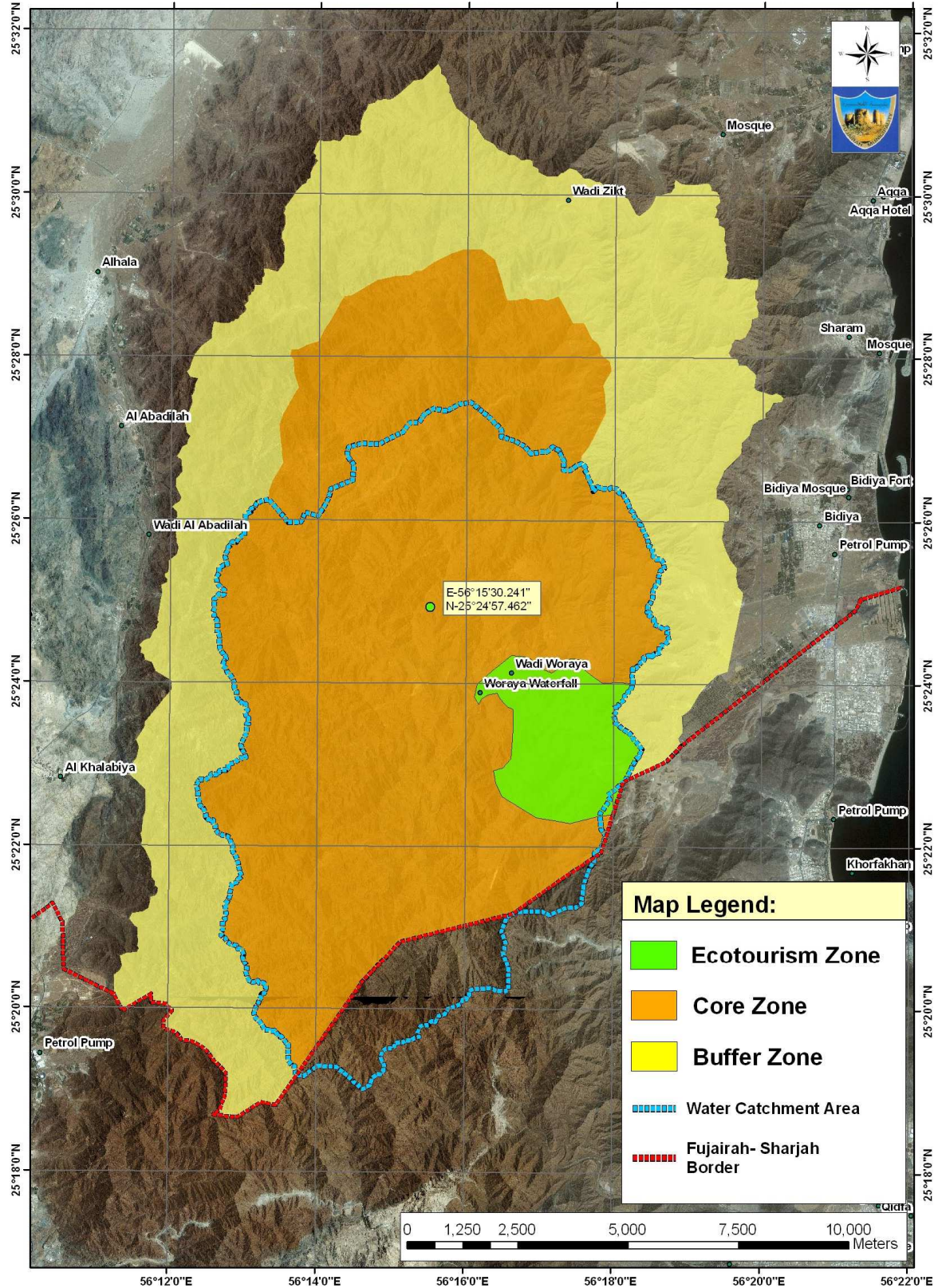
### Appendix A: Location Map



Appendix 1: Map Showing Ramsar Site Boundary



**Appendix 2: Part of Catchment Basin (in pale blue) for Inclusion in UAE Ramsar Site List**



### Appendix 3: List of species recorded in Wadi Wurayah Mammals of Wadi Wurayah area and their conservation status

Common Name	Scientific Name	EWS-WWF survey 2006-2009	Others	IUCN Red List (2007)	UAE Red List (Hornby 1996b)
Brandt's Hedgehog	<i>Hemiechinus hypomelas</i>	X	X	LR/lc	LC
Muscat Mouse-tailed Bat	<i>Rhinopoma muscatellum</i>	X	X	LR/lc	DD
Naked-rumped Tomb Bat	<i>Taphozous nudiventris</i>			LR/lc	DD
Trident Leaf-nosed Bat	<i>Asellia tridens</i>			LC	DD
Persian Leaf-nosed Bat	<i>Triaenops persicus</i>			LC	DD
Sind Serotine Bat	<i>Eptesicus nasutus</i>			VU	DD
Kuhl's Pipistrelle	<i>Pipistrellus kuhlii</i>			LC	Not Listed
Hemprich's Long-eared Bat	<i>Otonycteris hemprichii</i>			LR/lc	DD
Red Fox	<i>Vulpes vulpes</i>	X	X	LC	LC
Blanford's Fox	<i>Vulpes cana</i>	X	X	VU	VU
White-tailed Mongoose	<i>Ichneumia albicauda</i>			LR/lc	Not Listed
Gordon's Wildcat	<i>Felis silvestris gordonii</i>	X	X	LC	EN
Caracal Lynx	<i>Caracal caracal schmitzi</i>	X	X	LC	VU
Arabian Leopard	<i>Panthera pardus nimr</i>	X?	X	CR	CR
Arabian Tahr	<i>Hemitragus jayakari</i>	X	X	EN	CR
Mountain Gazelle	<i>Gazella gazella cora</i>	X	X	VU	VU
Rat unidentified	<i>Rattus sp.</i>	X		-	LC
Egyptian Spiny Mouse	<i>Acomys cahirinus</i>	X	X	LC	NT
Wagner's Gerbil	<i>Gerbillus dasyurus</i>	X		LR/lc	DD
Baluchistan Gerbil	<i>Gerbillus nanus</i>			LC	DD

#### Notes

- Others: Hornby (1996a), Stuart and Stuart (1996), Sawaf (1999)
- Significance according to the IUCN Red List criteriae (IUCN 2007): DD: data deficient, LR: lower risk, LC: least concern, NT: near threatened, VU: vulnerable, EN: endangered, CR: critically endangered, EW: extinct in the wild
- In grey: species for which the presence in Wadi Wurayah has still to be determined

**Appendix 4: Bird species of Wadi Wurayah area and their conservation status**

Species	Scientific name	EWS-WWF survey 2006-2009	Others	IUCN Red List (2007)	UAE status
Little Grebe	<i>Tachybaptus ruficollis</i>	X	X	LC	
Little Bittern	<i>Ixobrychus minutus</i>	X		LC	
Grey Heron	<i>Ardea cinerea</i>	X		LC	
Common Teal	<i>Anas crecca</i>	X		LC	
Mallard	<i>Anas platyrhynchos</i>	X		LC	
Egyptian Vulture	<i>Neophron percnopterus</i>		X	EN	RT
Griffon Vulture	<i>Gyps fulvus</i>		X	LC	
Lappet faced Vulture	<i>Torgos tracheliotos</i>		X	VU	GTV
Short toed Eagle	<i>Circaetus gallicus</i>		X	LC	
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	X	X	LC	
Long-legged Buzzard	<i>Buteo rufinus</i>	X		LC	
Bonelli's Eagle	<i>Hieraaetus fasciatus</i>	X	X	LC	ND
Lesser Kestrel	<i>Falco naumanni</i>		X	VU	GTV
Kestrel	<i>Falco tinnunculus</i>	X	X	LC	
Barbary Falcon	<i>Falco pelegrinoides</i>		X	LC	ND
Chukar	<i>Alectoris chukar</i>		X	LC	
Sand Partridge	<i>Ammoperdix heyi</i>	X	X	LC	RR
Grey Francolin	<i>Francolinus pondicerianus</i>	X	X	LC	
Coot	<i>Fulica atra</i>	X		LC	
Houbara Bustard	<i>Chlamydotis macqueeni</i>	X		VU	GTN
Black winged Stilt	<i>Himantopus himantopus</i>	X		LC	RI
Red-wattled Lapwing	<i>Vanellus indicus</i>	X		LC	
Green Sandpiper	<i>Tringa ochropus</i>	X		LC	
Lichtenstein's Sandgrouse	<i>Pterocles lichtensteinii</i>	X	X	LC	
Rock Dove	<i>Columba livia</i>	X	X	LC	
Collared Dove	<i>Streptopelia decaocto</i>	X	X	LC	
European Turtle Dove	<i>Streptopelia turtur</i>		X	LC	
Laughing Dove	<i>Streptopelia senegalensis</i>	X	X	LC	
Hume's Tawny Owl	<i>Strix butleri</i>	X		LC	
Desert Eagle Owl	<i>Bubo ascalaphus</i>	X?	X	LC	ND
Spotted Eagle Owl	<i>Bubo africanus</i>	X?	X	LC	
Little Owl	<i>Athene noctua</i>	X	X	LC	
Common Swift	<i>Apus apus</i>	X		LC	
Pallid Swift	<i>Apus pallidus</i>	X		LC	
Common Kingfisher	<i>Alcedo atthis</i>	X	X	LC	
Little Green Bee-eater	<i>Merops orientalis</i>	X	X	LC	
Indian Roller	<i>Coracias benghalensis</i>	X	X	LC	
Eurasian Hoopoe	<i>Upupa epops</i>	X		LC	
Desert Lark	<i>Ammomanes deserti</i>	X	X	LC	



Crested Lark	<i>Galerida cristata</i>	X	X	LC	
African Rock Martin	<i>Ptyonoprogne fuligula</i>	X		LC	
Pale Crag Martin	<i>Hirundo obsoleta</i>		X	LC	
Barn Swallow	<i>Hirundo rustica</i>	X		LC	
Long-billed Pipit	<i>Anthus similis</i>	X	X	LC	
Yellow Wagtail	<i>Motacilla flava</i>	X		LC	
Grey Wagtail	<i>Motacilla cinerea</i>	X	X	LC	
Yellow-vented Bulbul	<i>Pycnonotus xanthopygos</i>	X	X	LC	RR
Black Redstart	<i>Phoenicurus ochruros</i>	X		LC	
Rufous-tailed Wheatear	<i>Oenanthe xanthopygma</i>	X	X	LC	RR
Variable Wheatear	<i>Oenanthe picata</i>		X	LC	
Mourning Wheatear	<i>Oenanthe lugens</i>	X		LC	
Hooded Wheatear	<i>Oenanthe monacha</i>	X		LC	RR
Hume's Wheatear	<i>Oenanthe albonigra</i>	X	X	LC	RR
Rufous –Tailed Rock-Thrush	<i>Monticola saxatilis</i>	X		LC	
Blue Rock Thrush	<i>Monticola solitarius</i>	X		LC	
Graceful Warbler	<i>Prinia gracilis</i>	X	X	LC	
Scrub Warbler	<i>Scotocerca inquieta</i>	X	X	LC	
Upcher's Warbler	<i>Hippolais languida</i>		X	LC	RR
Menetries' Warbler	<i>Sylvia mystacea</i>	X	X	LC	RR
Desert Lesser Whitethroat	<i>Sylvia minula</i>		X	LC	RR
Plain Leaf Warbler	<i>Phylloscopus neglectus</i>		X	LC	RR
Arabian Babbler	<i>Turdoides squamiceps</i>	X	X	LC	RR
Purple Sunbird	<i>Nectarinia asiatica</i>	X	X	LC	
Southern Grey Shrike	<i>Lanius meridionalis</i>	X	X	LC	
Steppe Grey Shrike	<i>Lanius pallidirostris</i>		X	LC	
House Crow	<i>Corvus splendens</i>	X		LC	
Brown-necked Raven	<i>Corvus ruficollis</i>	X	X	LC	
Common Mynah	<i>Acridotheres tristis</i>	X	X	LC	
House Sparrow	<i>Passer domesticus</i>	X	X	LC	
Pale Rock Sparrow	<i>Petronia brachydactyla</i>		X	LC	
Chestnut-shouldered Petronia	<i>Petronia xanthocollis</i>		X	LC	
White-throated Munia	<i>Lonchura malabarica</i>	X	X	LC	
House Bunting	<i>Emberiza striolata</i>	X	X	LC	

**Notes:**

- Others: Aspinall (1995,1996), Hornby (1996a), Stuart and Stuart (1996), Richardson (1997, 2003), Emirates Natural History Groups (pers. com.)
- highlighted in green: species breeding or suspected breeding in the area
- Significance of the IUCN Red List criteriae (IUCN 2007): CR: critically endangered, DD: data deficient, LC: least concern, NT: near threatened, VU: vulnerable, EN: endangered, EW: extinct in the wild
- Significance of the UAE status (Hornby and Aspinall 1996 and Javed 2004): GTN: Globally Threatened (Near Threatened), GTV: Globally Threatened (Vulnerable), GTN: Globally Threatened (Near Threatened) RR: Restricted Range, RI: Regionally Important, ND: Native and Declining

### Appendix 5: Reptile and Amphibian species of Wadi Wurayah area and their conservation status

Common Name	Scientific Name	EWS-WWF survey 2006-2009	Others	IUCN Red List (2007)
Sinai Agama	<i>Pseudotrapelus sinaitus</i>	X	X	Not Listed
Bar-tailed Semaphore Gecko	<i>Pristurus celerrimus</i>	X	X	Not Listed
Rock semaphore Gecko	<i>Pristurus rupestris</i>	X	X	Not Listed
Fan-footed Gecko	<i>Ptyodactylus hasselquistii</i>	X	X	Not Listed
Banded ground gecko	<i>Bunopus spatulurus hajarensis</i>	X	X	Not Listed
House gecko	<i>Hemidactylus sp.</i>		X	Not Listed
Blue-tailed Oman Lizard	<i>Omanosaura cyanura</i>	X	X	Not Listed
Jayakar's Oman lizard	<i>Omanosaura jayakari</i>	X	X	Not Listed
Tessellated Mabuya	<i>Mabuya tessellata</i>	X	X	Not Listed
Ocellated Skink	<i>Chalcides ocellatus ocellatus</i>	X	-	Not Listed
Wadi Racer	<i>Platycephalus rhodorachis</i>	X	X	Not Listed
Schokari Sand Racer	<i>Psammophis schokari</i>		X	Not Listed
Sind Saw-scaled Viper	<i>Echis carinatus sochureki</i>		X	Not Listed
Oman Saw-scaled Viper	<i>Echis omanensis</i>	X	X	Not Listed
Arabian Toad	<i>Bufo arabicus</i>	X	X	Not Listed
Dhofar Toad	<i>Bufo dhufarensis</i>	X	X	Not Listed
Red-eared Slider	<i>Trachemys scripta</i>	X	-	Not Listed

#### Notes

1. Others: Hornby (1996a), Stuart and Stuart (1996), Segan (pers. com.), and Gardner (pers.com.)
2. in green: species endemic to Northern Oman-UAE
3. in pink: species endemic to Arabian Peninsula

**Appendix 6: Birds common species of Wadi Wurayah**

SPECIES	Scientific Name
Kestrel	<i>Falco tinnunculus</i>
Sand Partridge	<i>Ammoperdix heyi</i>
Laughing Dove	<i>Streptopelia senegalensis</i>
Desert Lark	<i>Ammomanes deserti</i>
African Rock Martin	<i>Ptyonoprogne fuligula</i>
Long-billed Pipit	<i>Anthus similis</i>
Yellow-vented Bulbul	<i>Pycnonotus xanthopygos</i>
Hume's Wheatear	<i>Oenanthe albonigra</i>
Graceful Warbler	<i>Prinia gracilis</i>
Scrub Warbler	<i>Scotocerca inquieta</i>
Purple Sunbird	<i>Nectarinia asiatica</i>
Brown-necked Raven	<i>Corvus ruficollis</i>
House Bunting	<i>Emberiza striolata</i>