

# Al Wathba Wetland Reserve, Abu Dhabi emirate: successful mixing of birds and people

OSCAR CAMPBELL, SÀLIM JAVID, SHAIKA AL DHAHERI, KHALDOUN AMEEN AL OMARI, PRITPAL SOORAE & AHMED AL DHAHERI

Al Wathba wetland reserve was one of the first protected areas in Abu Dhabi emirate, United Arab Emirates and the first in Abu Dhabi emirate to be declared a 'wetland of international importance' under the Ramsar Convention on wetlands. The reserve supports a rich array of wildlife, including globally and nationally threatened species. Since 2011, Greater Flamingos *Phoenicopterus roseus* have bred annually, the only site in the Arabian peninsula where this has occurred. In all, the site has recorded 236 species of resident and migratory birds, and has significant biodiversity in general. Part of the reserve was opened to the public in 2014, in an initiative that is unusual in the UAE. This article outlines the ornithological importance of the reserve and discusses the visitor experience.

## INTRODUCTION

Al Wathba wetland reserve (hereafter AWWR, Plates 1 & 2) is located at 24.26° N, 54.60° E, c40 km east south east of Abu Dhabi island/city and lies within a 30 minute drive of over one million people. AWWR covers an area of 5 km<sup>2</sup>, and is bordered by busy highways to the immediate south and 3 km to the north, with industrial development to the east and west. The area, formerly known as 'Al Ghar', had long been known to become saturated with water during the winter months and construction of a highway, the current Abu Dhabi city–Al Ain truck road, acted as a barrier to through flow and allowed water accumulation to its north. Heavy rains during the 1989–90 winter led to an ephemeral but bird-rich wetland, which soon attracted the interest of members of the local chapter of Emirates Natural History Group, some of whom were soon working tirelessly to generate official interest in the ornithological and conservation value of the site. Following an unsuccessful breeding attempt by Greater Flamingos *Phoenicopterus roseus* in 1993, and a successful one in 1998, the site was finally declared a reserve in the latter year and was then completely enclosed by a perimeter fence, greatly reducing potential disturbance. Aspinall & Hellyer (1999) documented the initial history of the reserve and drew attention to the many individuals who worked towards its eventual establishment. The site has been under Environment Agency–Abu Dhabi (hereafter EAD) management since designation of reserve status, being declared a Ramsar site in 2013, the first site in Abu Dhabi emirate to be so accredited. With the completion of visitor facilities in 2014, the site was opened to the public and is currently open two days per week, October–April each year. This article describes the habitat and management regime at the site and puts its nationally significant avifauna in context. Further, it highlights some of the scientific work carried out by EAD and outlines the success of the site as an educational and leisure facility, unique in a UAE context.

## HABITAT, FLORA AND SURROUNDING AREAS

The main water body within AWWR comprises a seasonally variable and highly saline lake on sabkha (a salt flat), with a convoluted shoreline of c5 km during winter peak water levels. Water depths occasionally reach 2 m but are generally 1 m or less whilst salinity is typically 180 parts per thousand. In the past the site naturally flooded in winter, but water levels are now maintained by discharges of tertiary-treated waste water from the large water treatment plant nearby. Eutrophication (nutrients from the water treatment plant) has led to the development of extensive areas of Common Reed *Phragmites australis* along



Plate 1. AWWR view looking south from the visitor centre, January 2018. © Oscar Campbell



Plate 2. Signs marking out trails for visitors, AWWR January 2018. © Oscar Campbell

the more sheltered northern shore. In particular, the northeastern section (closest to the inflow from the water treatment plant) has acquired several (relatively deep and fresh) *Phragmites*-fringed ponds along with a series of shallower pools that, like the main lake, vary greatly in extent seasonally. Saturated saline areas are typically dominated by stands of *Tamarix*. Lake environs include small, wind-sculpted dunes, ridges and sand sheets dominated by *Zygophyllum* (*Tetraena*) *qatarense* with *Cyperus conglomeratus* and *Haloxylon persicum* also prominent. The latter is of considerable biogeographical importance, as this is the most easterly limit reached by the species in Arabia. The flowering parasitic perennials *Cistanche tubulosa* and *Cynomorium coccineum* are obvious from January–February especially after rain. 39 plant species have been documented so far.

As well as the reserve area itself, many birds, especially marsh terns, shorebirds and hirundines, utilize the food-rich aeration ponds and settling beds of the adjacent water treatment plant and commute to the lake for rest and roosting. In contrast, Western Marsh Harriers *Circus aeruginosus* and Eurasian Collared Doves *Streptopelia decaocto*, foraging over more distant desert and plantations, return to roost each evening. A municipal rubbish tip 3 km away attracts gulls and Western Cattle Egrets *Bubulcus ibis* during the course of the winter and large numbers of both also roost on the reserve, albeit somewhat erratically. Finally, the intertidal mud flats of Bul Syayeeef (managed as a marine protected area by EAD) are 18 km to the west, and interchange of shorebirds and Greater Flamingos is frequent.

## MANAGEMENT REGIME

The prime management objective from the outset has been the maintenance and expansion of the breeding population of Greater Flamingos. To this end, an artificial island has been created and has been used by breeding Greater Flamingos successfully since 2011. Water levels are allowed to steadily drop from spring onwards, so providing sufficient island extent to support breeding birds. By early autumn, the levels are typically very low but are allowed to rise again from October onwards. This freshwater influx reduces salinity and makes the lake more suitable for over-wintering shorebirds and ducks. To support breeding Greater Flamingos, during the summer months (when natural food is limited), supplementary feeding is provided from time to time. Natural food for Greater Flamingos includes brine shrimps *Artemia* and the site is managed to maximize *Artemia* biomass.

One issue likely to become increasingly important in the near-future is the management of increasing numbers of visitors whilst preserving the ecological integrity of the reserve. Table 3 presents numbers of visitors each season, since the reserve was formally opened to the public.

Avoiding disturbance of the important bird species is of primary importance. Restricting the number of days on which the reserve is open and limiting visitors to a small proportion of the site is part of the current approach. Another important issue is the maintenance of important habitats such as freshwater pools and shallow scrapes which are prone to being rapidly choked by Common Reed due to natural succession. Such habitats are extremely scarce in the UAE as a whole and require regular active management to maintain their biodiversity and appeal to visitors.

## VISITOR FACILITIES

In contrast to many projects in the UAE, visitor facilities have been low key, simple and effective. Visitors are restricted to the north-central sector of the reserve, with other areas, including the entire southern shore, off-limits, although viewable from a distance. However, the accessible area is undoubtedly the most biologically varied and interesting part of the site. A small reception area greets visitors on arrival and optical equipment

is available for loan, and to view the flocks of Greater Flamingos and other shorebirds visible from the parking area. From here, two trails of 3 km and 1.5 km in length (round trip) lead through natural vegetated dunes and give good panoramas over the main lake. Eventually, after walking through tall reedbeds, a well-positioned hide gives close views of hundreds of Greater Flamingos; such a spectacle is surely the highlight for most visitors. A further hide overlooks a relatively deep, *Phragmites*-fringed pond, offering close views of a different range of species. Several interpretation boards are provided along the trail and all visitors on arrival are offered a complimentary reserve field guide which provides basic ecological information concerning the site and ecological and identification notes on the most conspicuous birds, mammals, reptiles, plants, mammals and invertebrates. The guide is also available for download (Soorae *et al* 2014).

With Phase 1 of the management plan now completed, Phase 2 is in the process of being implemented. This will include an additional path linking the main bird hide with a second hide via a cut walkway through a reedbed, provision of viewing towers and improvement of facilities for visitors with limited mobility. The current paths, on rather soft, sandy tracks and with limited shade, unfortunately restrict access to a proportion of visitors.

## AVIFAUNA OVERVIEW

AWWR is the most important non-estuarine site for waterbirds in the UAE. Although bird numbers and diversity are high late August–early May, peak numbers occur in mid winter and annual counts have been undertaken in mid January of each year, under the aegis of the International Waterbird Census (co-ordinated nationally by EAD). Data for selected key species and total numbers recorded from these annual censuses 2013–2018 are presented in Table 1. As well as Greater Flamingo, AWWR is particularly significant in a national context for wintering populations of six species (Common Shelduck *Tadorna tadorna*, Northern Shoveler *Anas clypeata*, Glossy Ibis *Plegadis falcinellus*, Western Marsh Harrier, Pied Avocet *Recurvirostra avosetta* and Marsh Sandpiper *Tringa stagnatilis*) and data for these species, comparing them to the second-best site for each in the UAE, are presented in Table 2. Small numbers of the Vulnerable Greater Spotted Eagle *Aquila clanga* overwinter annually and a small flock of the Near Threatened Ferruginous Duck *Aythya nyroca* has recently become established October–March. Breeding birds are much less diverse

**Table 1.** Selected data from mid January counts at Al Wathba wetland reserve (under IWC aegis) 2013–2018 (Source: OC *pers obs*).

	2013	2014	2015	2016	2017	2018
<b>Common Shelduck</b> <i>Tadorna tadorna</i>	70	153	177	90	260	175
<b>Eurasian Teal</b> <i>Anas crecca</i>	40	0	14	120	103	75
<b>Northern Shoveler</b> <i>Anas clypeata</i>	540	3	177	90	260	175
<b>Greater Flamingo</b> <i>Phoenicopterus roseus</i>	2575	3100	2600	3000	3600	2500
<b>Glossy Ibis</b> <i>Plegadis falcinellus</i>	24	20	70	35	0	2
<b>Black-necked Grebe</b> <i>Podiceps nigricollis</i>	30	15	15	27	12	10
<b>Little Grebe</b> <i>Tachybaptus ruficollis</i>	25	22	25	50	65	50
<b>Pied Avocet</b> <i>Recurvirostra avosetta</i>	76	70	75	180	149	70
<b>Little Stint</b> <i>Calidris minuta</i>	1100	250	150	350	1000	250
<b>Marsh Sandpiper</b> <i>Tringa stagnatilis</i>	25	30	40	25	45	30
Total	8100	4400	4900	4800	6300	3700

**Table 2.** Counts of six nationally important bird species at Al Wathba wetland reserve, compared to the second best site in the UAE. Data obtained by averaging the peak annual count for the years 2011–2016. Figures in brackets indicate site maxima (Source: OC pers obs, UAE Bird Database).

	Al Wathba wetland reserve	Second best UAE site	
<b>Common Shelduck</b> <i>Tadorna tadorna</i>	168 (243)	22 (76)	Ras al Khor
<b>Northern Shoveler</b> <i>Anas clypeata</i>	683 (1200)	144 (350)	Zakher lake
<b>Glossy Ibis</b> <i>Plegadis falcinellus</i>	43 (74)	20 (40)	Zakher lake
<b>Western Marsh Harrier</b> <i>Circus aeruginosus</i>	25 (47)	19 (34)	Al Warsan lakes
<b>Pied Avocet</b> <i>Recurvirostra avosetta</i>	106 (180)	21 (60)	Ras al Khor
<b>Marsh Sandpiper</b> <i>Tringa stagnatilis</i>	37 (55)	<10 (30)	No other UAE site regularly exceeds 10 birds

than those over-wintering but importantly include Greater Flamingo. Indeed, AWWR is the only breeding site for this species in the Arabian peninsula (Jennings 2010) and the 1993 breeding attempt was the first on the peninsula since 1922 (Aspinall & Hellyer 1999). The nationally highly localised White-tailed Lapwing *Vanellus leucurus* and Purple Swamphen *Porphyrio porphyrio* nest annually, the latter a recently established breeding resident (Campbell 2013) with larger numbers of Eurasian Coots *Fulica atra*, also a recent

colonist. Black-necked Grebe *Podiceps nigricollis* and Ferruginous Duck are suspected of overwintering some years and are potential breeders, at least on an irregular basis. Indeed, Black-necked Grebe did breed successfully in 2000 (Aspinall 2010). Passage of migratory birds is most obvious in autumn, including Garganey *Anas querquedula*, Sand Martin *Riparia riparia*, Barn Swallow *H. rustica*, and several species of shorebirds and herons. Notable spring passages of Red-necked Phalaropes *Phalaropus lobatus* and Curlew Sandpipers *Calidris ferruginea* are also of interest. Further details on a selection of species of particular significance or interest are given in the Avifauna highlights section below.

As of March 2018, the list of avian species recorded at AWWR, and recorded in the UAE Bird Database, stands at 236 of which 20% are shorebirds. Of these, 28% are predominately overwintering whilst 43% are passage migrants and 13% breeders, the balance being vagrants. Vagrants include the critically endangered Sociable Lapwing *Vanellus gregarius*, the first national record of Wilson’s Phalarope *Steganops tricolor* (Campbell 2010), three records (out of five nationally) of Grey Phalarope *Phalaropus fulicarius* and two records of Lesser Flamingo *P. minor* (Pedersen *et al* 2017). The most recent significant addition to the site list was Great White Pelican *Pelecanus onocrotalus*, recorded in March 2018 (S Khan *in litt*).

## OTHER FAUNA

In AWWR, a total of 15 reptile species, ten mammal species and 354 invertebrates have been documented. In all, 21% of Abu Dhabi emirate’s terrestrial animal and plant species have been recorded at AWWR. Reptiles include the flagship species Spiny-tailed Lizard *Uromastyx aegyptia* and Desert Monitor *Varanus griseus*. In addition, the uncommon Iranian

**Table 3.** Number of visitors to Al Wathba wetland reserve per season 2014–2018. The site is open two days weekly, and the visiting season is mid October–end of April (Source: EAD unpublished data).

Season	No of visitors
2014–2015	2560
2015–2016	4046
2016–2017	5389
2017–2018 (to February 2018)	5780

Sand Skink *Scincus scincus* occurs. Larger mammals present, albeit at low densities, include Desert Hare *Lepus capensis*, Egyptian Hedgehog *Paraechinus aethiopicus* and Red Fox *Vulpes vulpes* (the latter two presumably a potential threat to ground-nesting bird species). An important recent discovery was Savi's Pygmy Shrew *Suncus etruscus*, which is rare across the UAE as a whole. Invertebrate diversity is still being audited, with various dragonflies perhaps the most obvious to the casual visitor. The latter comprise solely species adapted to eutrophic, anthropogenic sites but have included the rare and erratic migrant Red-veined Darter *Sympetrum fonscolombii* during occasional influxes (Campbell & Reimer 2011). A most interesting discovery was that of *Hedychridium anithaae*, a tiny species of cuckoo wasp collected in 2009 and identified as a new species to science in 2014 (Strumia 2014).

## MONITORING AND SCIENTIFIC WORK

As well as regular bird counts, baseline surveys concerning all biota and monitoring of water quality and brine shrimp levels, AWWR has been the focus of a number of scientific projects. These have included a study on the breeding ecology of Kentish Plover *Charadrius alexandrinus* in hot environments (Kosztolányi *et al* 2009) and satellite tracking of several key species. In 2005, EAD started satellite tracking of Greater Flamingos from AWWR (Javed *et al* 2006) as part of a larger programme to study movement and migration of important migratory species wintering or breeding in the UAE. Across the UAE as a whole, this work has also included the first tracking of Sooty Falcon *Falco concolor* Abu Dhabi–Madagascar (Javed *et al* 2011) and tracking of Steppe Eagle *Aquila nipalensis* (Javed *et al* 2014a). Further, EAD has also tracked five Greater Spotted Eagles and six Western Marsh Harriers from AWWR (Javed *et al* 2014b).

The satellite tracking study of five Greater Flamingos, initiated in November 2005, has allowed EAD to establish migration routes of the species along with vital information on the stopover sites used. The work has also established site use of the species from a local perspective and established the connectivity of different wetlands, and hence the necessity of landscape scale coastal protection, rather than merely protecting one or a few individual core sites. It has also indicated the importance of the reserve as a wintering ground for the species, many individuals of which arrive in autumn and spend up to six months at AWWR, before returning to central Asia to breed. One of the satellite tracked individuals, departing the UAE in late February, staged in southern Iran for two months before reaching southwest Turkmenistan by early June. In all, this individual was tracked for 2100 km and utilized no less than 11 different wetland sites during its migration (Javed *et al* 2006). A further bird was also tracked to lake Uromiyeh, northern Iran.

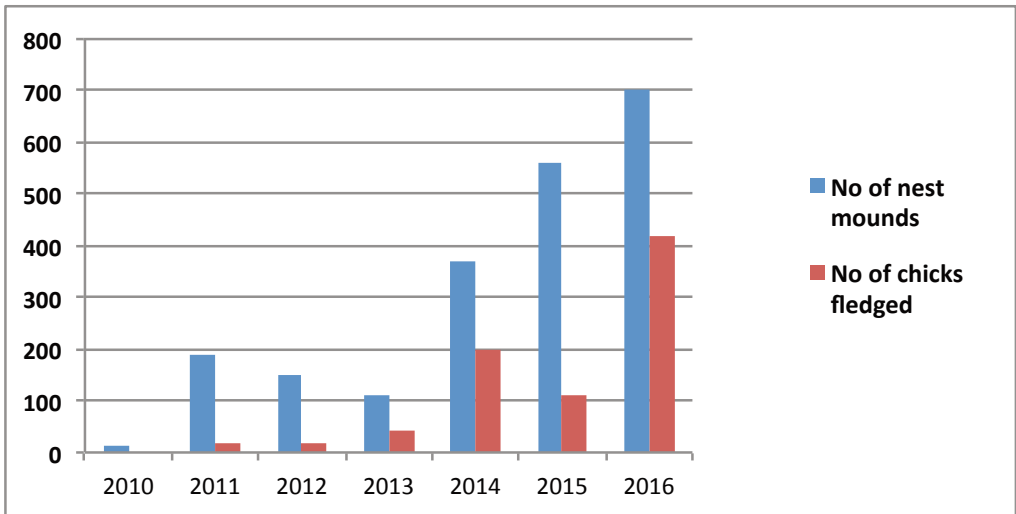
## AVIFAUNA HIGHLIGHTS

### *Greater Flamingo (Plate 3)*

This is the flagship species of AWWR and numbers are closely monitored as part of regular management. Viewing large numbers at close quarters is a major draw for large numbers of visitors. Whilst numbers fluctuate, in recent years 1000–3000 have been regularly present all year. Whilst unsuccessful breeding attempts have been regular since 1993, successful breeding did not occur until December 1998, with 10 young fledging in April 1999 (Aspinall 2010). Successful breeding has occurred annually since 2011 (Khan *et al* 2017), mainly during the summer months and on a specially created island, although attempts have also been made at other seasons and on the lake environs (where the species is much more vulnerable to disturbance and predation). As Figure 1 suggests, with continued management, the future of this charismatic species at AWWR seems assured. However, it seems unlikely that this rate of increase can be sustained indefinitely, with,



**Plate 3.** Nesting Greater Flamingos *Phoenicopterus roseus*, AWWR, May 2014. © Oscar Campbell

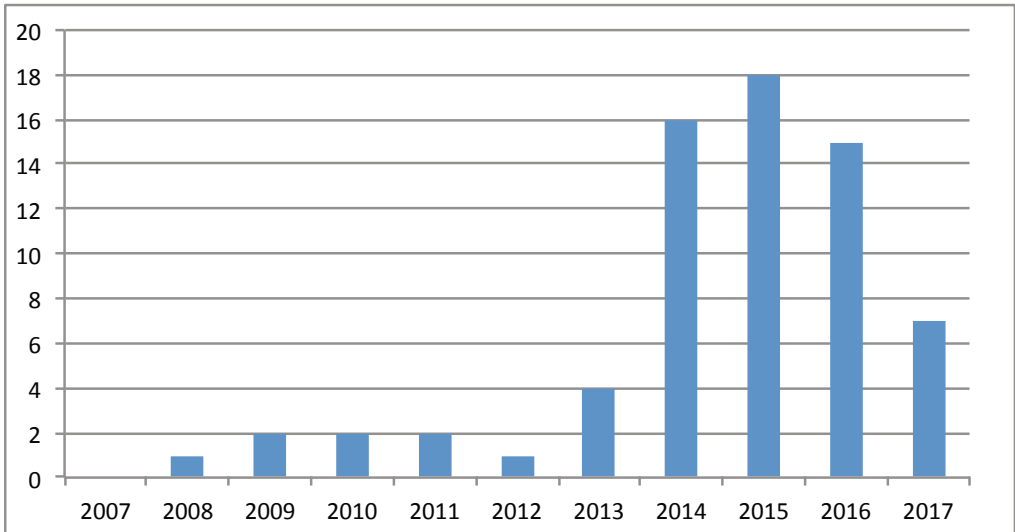


**Figure 1.** Annual numbers of Greater Flamingo *Phoenicopterus roseus* nesting mounds and young fledged at AWWR 2010–2016 (source: Khan *et al* 2017).

for example, the area available for nesting on the provided island being one limitation. Currently, AWWR remains the only site with regularly breeding flamingos in the UAE and, indeed, in the Arabian peninsula.

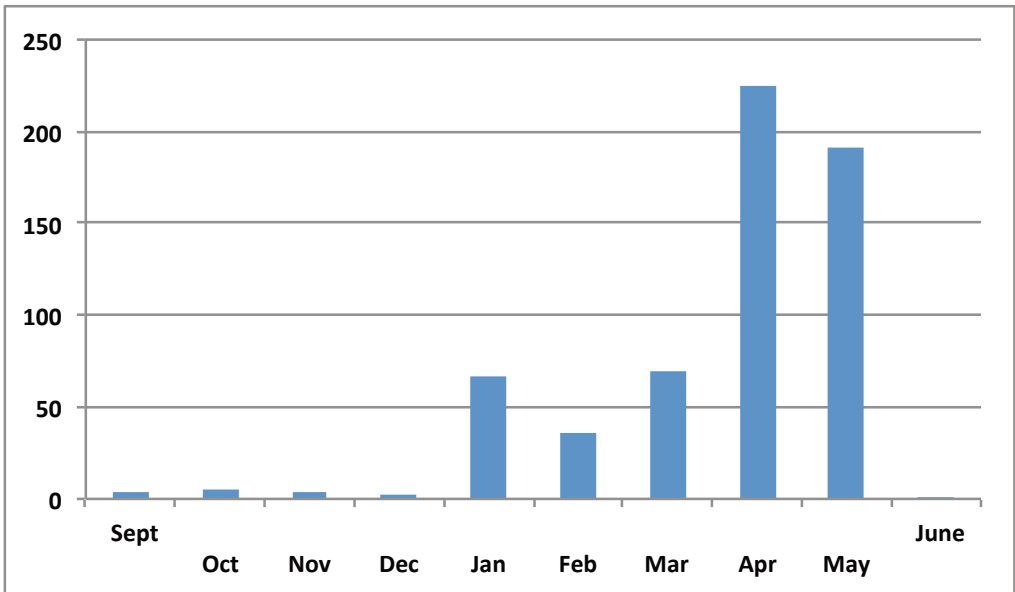
### *Ferruginous Duck*

This diving duck is classified as Near Threatened on account of rapid declines across its European breeding range (BirdLife International 2017a). For both breeding and wintering



**Figure 2.** Peak annual counts of Ferruginous Ducks *Aythya nyroca* at AWWR 2007–2017 (source: OC pers obs).

it is strongly associated with eutrophic, well vegetated, wetlands of standing water and this habitat has developed strongly in certain sectors of AWWR in recent years. The species, formerly a scarce and erratic autumn migrant, now over-winters regularly in small numbers (Figure 2), with, in addition, records of individuals in summer almost annually May–September from 2013 onwards. Breeding has not been confirmed for the UAE but remains a distinct possibility, given that breeding has occurred regularly in Saudi Arabia and Qatar (Jennings 2010).



**Figure 3.** Numbers of Curlew Sandpipers *Calidris ferruginea* at AWWR September–June. Average of peak monthly counts 2006–2017 (source: OC pers obs).





Impressed by the experience in 2017, NM returned to AWWR with another Sunbird group in 2018. We were not only treated to another very warm welcome but also a Baillon's Crake and a Moustached Warbler!

### **Box 1: AWWR – then and now**

*Nick Moran*

It's easy to reflect on days gone by and conclude it was much better back then, particularly where the environment is concerned. For me, however, Al Wathba wetland reserve certainly bucks that trend!

The area of irrigated fodder fields encircled by Al Wathba camel racetrack was *the* must-visit birding site within easy reach of Abu Dhabi city and, following my arrival in Abu Dhabi in September 2004, quickly became established as a regular weekend haunt. In contrast, AWWR—surrounded by a 3m high chain-link fence—was broadly off limits and received little more than a few longing glances from the roadside.

I finally made my first 'proper' visit to AWWR in November 2005. Enough of the lake's birdlife was visible through the fence to see over 200 Greater Flamingos, a few Black-necked Grebes, a Ferruginous Duck and a tantalising array of shorebirds, including Marsh Sandpipers, hundreds of Little Stints and a White-tailed Lapwing. The birding potential of the site was clear, and during the winter I made several more visits, recording high counts of 842 Northern Shovelers and 13 Bluethroats, and encountering nationally scarce species including Spotted Crake, Asian Wire-tailed and Streak-throated Swallows.

During 2006–2009 AWWR became a mainstay of my local birding circuit, generating many memorable birding moments. Aside from pre-arranged visits, however, the 'visitor experience' was not a positive one, largely made up of viewing through the perimeter fence from the roadside. It definitely wasn't a place to take visitors. Fast forward to January 2017, and a Sunbird tour I led to the UAE. To my surprise, bringing a group to AWWR was now not only possible but highly recommended, and we received a wonderful welcome from the EAD team. Indeed the site is now certainly the most birder-friendly location in the whole country, and demands inclusion on any visitor's itinerary! A viewing area gave us spectacular views of the flamingos and assorted waders, and guided by OC we ambled the simple but effective trail network, enjoying close views of Ruddy Shelduck and Red-crested Pochard, both rare visitors to the UAE, and Grey-headed Swamphen, a species that back in the 2000s had yet to be recorded breeding anywhere in Abu Dhabi emirate. As the sun dropped, we left with the enduring image of a peachy sky filled with thousands of gulls coming in to roost. So rather than looking back through rose-tinted spectacles on heady days gone by, it was instead this recent visit that gave me lasting memories of the better all-round birding experience.

### *Curlew Sandpiper*

An interesting facet of the Curlew Sandpiper's movements through the UAE is a marked build-up during spring passage at AWWR. A similarly significant spring passage is known from much of the eastern sector of the Western Palearctic and given this species' propensity to migrate long distances non-stop (Van Gils *et al* 2018) important stopover sites have particular significance. Averaged data by month 2006–2013 are presented in Figure 3, although large flocks (up to 800, with four counts exceeding 1000) have been recorded since at least 1993 (UAE Bird Database). Unusually compared to most shorebird species using the site, this species is very scarce in the second half of the year but numbers increase noticeably from January and very significantly April–early May by when most birds are in breeding plumage. Departure is normally very abrupt with most birds gone by mid May. Timing of spring migration through Ras al Khor, Dubai emirate during a study conducted in 1995 had a similarly noticeable late April peak, followed by a sudden decline (Keijl & Ruiters 1998). Database records from other sites in the UAE suggest this significant spring passage is not unique to AWWR but it is most easily documented from there. This species is classified as Near Threatened (BirdLife International 2017b) on the basis of a suspected decline, due mainly to the loss of habitats used during migratory stopovers, especially in eastern Asia.

### *Purple Swamphen*

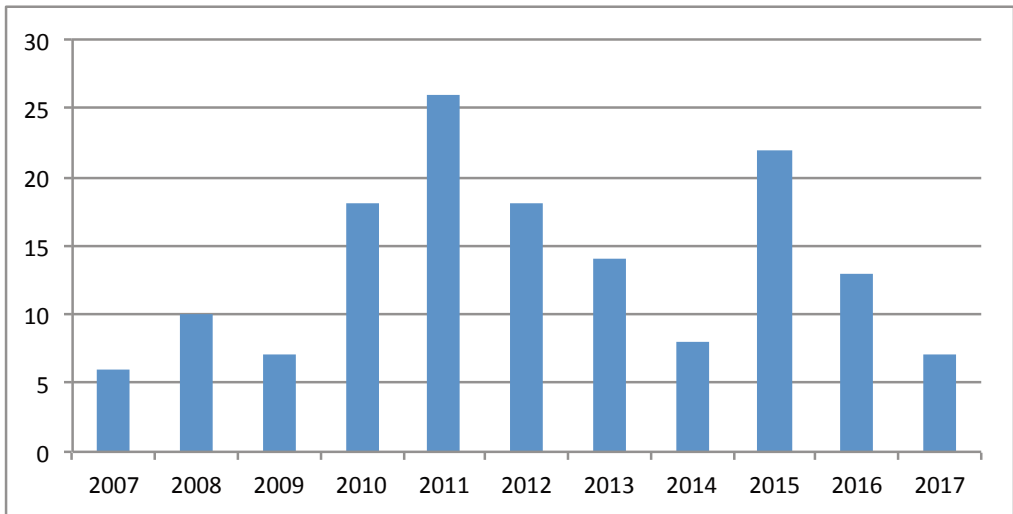
With no previous records from Abu Dhabi emirate, and a tiny national range (limited to several closely adjacent sites in the Greater Dubai area, 130 km northeast of AWWR), a record of this species in April 2011 was most unexpected. There were no subsequent records until January 2013 but since then the species has been recorded regularly (up to nine individuals) with breeding confirmed annually since April 2013, with half-grown chicks observed in January–early February each year 2016–2018. This is consistently earlier in the year than the breeding season indicated by the limited records summarized in Jennings (2010) for other sites in the Arabian peninsula. All birds observed to date have shown the characters of Grey-headed Swamphen, *P. [porphyrio] poliocephalus*. A summary of observations in 2013 and speculation on the origin of the birds that have colonized AWWR is provided by Campbell (2013).

### *Pied Avocet*

AWWR is by far the most important site in the UAE for this species (Table 2) and the only breeding site. Breeding was first recorded in 1996 when the species was much rarer in the UAE (Aspinall 2010) and currently occurs annually, although the number of pairs involved is very small. Birds are typically very scarce autumn–November when a sudden marked arrival usually results in over 100 present until early spring. Numbers then decrease markedly but a few pairs invariably remain to attempt to breed. Birds are noisy and conspicuous when they have eggs or young to defend, although the ultimate success (or otherwise) to fledging is poorly known.

### *White-tailed Lapwing*

This species was first recorded breeding in the UAE in Dubai in 1996 (Aspinall 2010) but has remained a scarce and highly localized resident since, with limited evidence of immigration or movement through the country. It was first recorded at AWWR in November 1996; breeding has been annual since 2007 at least (UAE Bird Database). However, numbers have remained small (maximum count 26, November 2011) and no more than four pairs have been confirmed to breed in recent years. Annual maxima are rather variable (Figure 4), although this may be a function of the species' reluctance to



**Figure 4.** Peak annual counts of White-tailed Lapwings *Vanellus leucurus* at AWWR 2007–2017 (source: OC pers obs).

form substantial flocks and tendency to utilize large areas at low density, including small and otherwise unappealing water bodies beyond AWWR. From a national perspective, with the demise of this species' main site in Dubai since 2015, AWWR has become proportionately even more significant for White-tailed Lapwing.

#### *Barn Swallow and Sand Martin*

These two hirundine species, generally present in rather low numbers throughout the winter and with no significant spring passage, regularly appear in much larger numbers during autumn migration, peaking late September–mid October (slightly earlier for Sand Martin than Barn Swallow). Up to 500 of the former and 1100 of the latter have been recorded, with birds utilizing the reedbeds to roost and arriving en masse in a spectacular manner after sunset, from feeding areas such as the adjacent water treatment plant and further afield. Counts of such magnitude are exceptional in the UAE (save for erratic large influxes of Barn Swallows at Zakher lake, Al Ain, Abu Dhabi emirate, at a similar time of year). Relatively small numbers remain to over-winter, but small influxes then may include scarcer species such as Red-rumped *Cecropis daurica* and even vagrant Wire-tailed Swallows *H. smithii* from the Indian sub-continent.

#### **ACKNOWLEDGEMENTS**

OC would like to thank all EAD staff for facilitating his visits to Al Wathba Wetland Reserve over many years, but in particular Mustafa Hamid, coordinator at AWWR and Sirtaj Khan for much valuable assistance. In addition, Alan Thomson and Suhail Omar Al Nuami facilitated visits to Mafraq water treatment plant to study the birds there. Thanks also to the many birdwatchers, both UAE-based and visiting who accompanied during many visits, and in particular to Nick Moran, who was regular company 2006–2009 and who provided Box 1. Tommy Pedersen gave much encouragement and data from the UAE Bird Database. Shahid Khan kindly made available a reprint of Khan *et al* (2017) whilst Anitha Saji did likewise for *Strumia* (2014). Peter Hellyer also supplied various references and made helpful comments on a draft. Nick Moran and Mark Smiles also reviewed and improved a draft, as did two anonymous reviewers.

#### **LITERATURE CITED**

Aspinall, S. 2010. *Breeding Birds of the United Arab Emirates*. Environment Agency–Abu Dhabi.  
 Aspinall, S & P Hellyer. 1999. The history and development of Al Wathba Lake, Abu Dhabi. *Tribulus* 9(2): 22–25.  
 BirdLife International. 2017a. *Species factsheet: Aythya nyroca*. www.birdlife.org. [Downloaded 31 October 2017]

- BirdLife International. 2017b. *Species factsheet: Calidris ferruginea*. www.birdlife.org. [Downloaded 31 October 2017]
- Campbell, O. 2010. First record of Wilson's Phalarope *Steganopus tricolor* in the United Arab Emirates. *Sandgrouse* 32 (2): 147–148.
- Campbell, O. 2013. Purple Swamphen as a new breeding bird in Abu Dhabi Emirate, and its status in the United Arab Emirates. *Tribulus* 21: 85–87.
- Campbell, O & RW Reimer. 2011. An influx of *Sympetrum fonscolombii* Selys in the United Arab Emirates. *Agrion* 15(1) : 20–21.
- Jennings, M. 2010. Arabian Breeding Bird Atlas. *Fauna of Arabia* 25: 1–751.
- Javed, S, S Khan, R Mansouri & EA Hosani. 2006. Satellite tracking of Greater Flamingos *Phoenicopterus roseus* from the United Arab Emirates. *Tribulus* 16: 16–17.
- Javed, S, D Douglas, S Khan, J Shah & AA Hammadi. 2011. First description of autumn migration of Sooty Falcon *Falco concolor* from the United Arab Emirates to Madagascar by satellite telemetry. *Bird Conservation International* 1–14 DOI 10.1017/50959270911000189.
- Javed, S, S Khan, J Shah, A Ahmed, AA Hammadi & EA Hammadi. 2014a. Satellite tracking of a young Steppe Eagle from the United Arab Emirates during two spring and autumn migrations. *Ostrich* 85: 131–138.
- Javed, S, S Khan, JN Shah, S Ahmed, AA Hammadi & EA Hammadi. 2014b. Studying migration of important birds from the United Arab Emirates - Satellite Tracking *Annual Report 2014*. Unpublished Report. Environment Agency-Abu Dhabi.
- Khan, SB, S Javed, S Ahmed, JN Shah, AA Al Hammadi & EA Al Hammadi. 2017. Greater Flamingo (*Phoenicopterus roseus*): Important wintering sites and breeding records in the United Arab Emirates. *Zoology of the Middle East* 63(3) : 194–201.
- Keijl, GO & PS Ruiters. 1998. Waterbird Studies. In: GO Keijl & P S Ruiters (eds). *Waders and other waterbirds in the United Arab Emirates, autumn 1994 and spring 1995*. Pp 29–77. WIWO 62, Zeist, Netherlands.
- Kosztolányi, A, S Javed, C Küpper, IC Cuthill, A Al Shamsi & T Székely. 2009. Breeding ecology of Kentish Plover *Charadrius alexandrinus* in an extremely hot environment. *Bird Study* 56(2): 244–252.
- Pedersen T, SJ Aspinall, OJ Campbell & MC Smiles (compilers). 2017. *EBRC Annotated Checklist of the birds of the United Arab Emirates*. [Available from www.uaebirding.com/uaechecklist.html. Accessed 21 October 2017]
- Soorae, PS, R Al Zaabi, A Saji, S Sakkir, S Ahmed & S Khan. 2014. *Al Wathba Wetland Reserve Field Guide*. Environment Agency-Abu Dhabi. [Available from: www.ead.ae/Documents/PDF-Files/Al-Wathba-Field-Guide\_2014\_EN.pdf]
- Strumia, F. 2014. Upgraded Checklist of the Chrysididae from the UAE. *Arthropod Fauna of the UAE* 5: 471–504.
- Van Gils, J, P Wiersma, GM Kirwan & CJ Sharpe. 2018. Curlew Sandpiper (*Calidris ferruginea*). In: del Hoyo, J, A Elliott, J Sargatal, DA Christie & E de Juana, E (eds). *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona. [Retrieved from www.hbw.com/node/53935 on 3 May 2018]

Oscar Campbell, British School Al-Khubairat, PO Box 4001 Abu Dhabi, UAE. ojcampbell25@yahoo.com

Sàlim Javed, Shaika Al Dhaheri, Khalidoun Ameen Al Omari, Pritpal Soorae & Ahmed Al Dhaheri, Environment Agency – Abu Dhabi, PO Box 45553, Al Mamoura Building, Murour Road, Abu Dhabi, United Arab Emirates. www.ead.ae