Conservation of scimitar-horned oryx & their arid steppe habitat in Tunisia 2016/2017

A report for the scimitar-horned oryx EEP

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Background

Marwell Wildlife has been working in Tunisia since 1985, with a focus on the reintroduction and management of scimitar-horned oryx (SHO), now broadened to include other threatened species, and the restoration of their arid-land ecosystems. Tunisia is an ecologically diverse country with an extensive network of protected areas covering 582,000 hectares of which 44% are located within the Sahelo-Saharan ecoregion. Our work contributes to a broader strategic framework for the management of these areas including the Convention on Migratory Species and the Convention of Biological Diversity, to both of which the Tunisian government are a signatory.

In 2016/2017 we made substantial progress against our project objectives, which was only possible due to the generous support of the EEP and our other international partners, and in close collaboration with our Tunisian colleagues.

Our main focus remains the monitoring of SHO populations re-established in their natural habitat within their indigenous range in four national parks (NP) and reserves: Dghoumes NP, Bou Hedma NP, Sidi Toui NP, and Oued Dekouk National Reserve. At the same time we are working closely with our local partners (Tunisian government and park managers) on joint conservation initiatives that aim to restore fully functioning ecosystems. These initiatives include reintroducing populations of the rare North African ostrich, monitoring other wild ungulate populations including reintroduced dorcas gazelle, Barbary sheep and addax, and providing veterinary support to wildlife populations.

We are continuing our mission to increase in-country expertise and capacity for wildlife and habitat management in collaboration with an increasing network of Tunisian academic and research institutions, including: the National Veterinary School of Sidi Thabet; Science Faculty of Tunis; Aridland Institute of Medenine; and Pasteur Institute of Tunis. Specifically we are continuing to train young veterinarians in the final year of their Wildlife Veterinary Medicine degree, and are including Tunisian Population Ecology Master degree students in our field work. With this still a priority, we are also seeking further means of training the next generation of Tunisian ecologists and conservationists, building strength for the future and ensuring the long-term survival of SHO and other key species and their ecosystems. Our Tunisia-based staff are also participating in national conferences, meetings, and scientific committees to raise awareness on the wider aspects of scimitar-horned oryx reintroductions and related conservation initiatives.

Monitoring of scimitar-horned oryx and the wider environment

Marwell has been working on the conservation of SHO in Tunisia for over 30-years, and has gained considerable expertise in reintroduction, monitoring and management techniques for the species and their habitat. The model of fully- or partially-fenced protected areas maintaining a metapopulation[1] of SHO maybe the only viable conservation solution for countries like Tunisia that lack the large tracts of continuous habitat necessary for re-establishing free-ranging populations of the species. This model requires continuous monitoring in order to implement an adaptive management system and to ensure that any problems are dealt with early on.

The four populations of SHO in Tunisia are now well-established and free-ranging within the national parks. We work to ensure that regular monitoring by park managers and their staff is

[1] A metapopulation is group of populations of the same species that are spatially separated, but linked to varying degrees allowing movement of individuals between them. Whilst occurring naturally under conditions of habitat discontinuity, they are relevant to conservation efforts where populations are separated for reasons of human intervention, such as protected areas and *ex-situ* management. The resilience of metapopulations, and the long-term survival of those species, is reliant on the movement of individuals and genetic exchange.

carried out consistently across the protected areas at regular intervals. A core part of our work has been to develop the skills of the local teams in all four parks and reserves that house the SHO enabling us to extend the survey effort to the national metapopulation. Vital data are routinely collected on all SHO populations on the location of groups, births, deaths, and any incidents of illnesses and injuries. We are also continuing our intensive monitoring of the SHO population and its habitat in Dghoumes National Park (DNP). Abdelkader Chetoui, the former 'Conservateur' (Park Manager) of DNP, is employed as part of the Marwell team and he visits DNP regularly, at least each week, to support the staff, collect data and implement new activities with Boudhief Yahyaoui, the head of personnel at DNP, and Chokri Essaoui, the current 'Conservateur'. As part of this work, we have begun a study to examine how the SHO are using their habitat, in particular, the mountain range that borders the arid steppe. The growing number of mature adults, most of which were born in Tunisia, in the DNP population is presenting some interesting challenges for monitoring the population. The SHO tend to avoid human presence, have split into small social units, and are exploring new areas making monitoring and management more challenging. Direct observations are becoming increasingly unpredictable, and there is an enhanced risk of uncontrolled pressures e.g. hunting or other anthropogenic impacts, predation from African golden wolves or feral dogs, or resource shortages. In collaboration with our Tunisian partners, we are undertaking work to understand the relative importance of these emerging threats and to develop new solutions to address concerns and ensure the continued survival of this important population.

Figure 1. a) Mr. Chokri Essaoui (left), DNP manager, Dr. Zouhair El Wadi, State veterinary services, Boudhief Yahyaoui, head of personnel at DNP, Dr. Chawki Najjar and Mr. Abdlekader Chetoui (Marwell) monitoring SHO together; b) Mohammed Ghanem, Anissa & Ines Dhaoui, and Mariem Mohammed, veterinary students (ENMV Sidi Thabet) being trained in SHO monitoring techniques.

Chawki Najjar, a wildlife veterinarian and ecologist, is also employed by Marwell and visits all the protected areas maintaining SHO bimonthly. Chawki reviews and updates the historical records at each park and collects additional data on SHO populations. Intensive studies of SHO and their habitat are undertaken seasonally by Abdelkader and Marie Petretto, our Tunisian Programme Manager, with help from our international team as required.

Tunisia's current SHO metapopulation strategy can be viewed as an intermediate step between fully *ex-situ* groups and the idealised free ranging herds that could disperse throughout the Sahel. The demographic trends of the Tunisian SHO population show that the species is now well established and the reintroduced animals have been able to adapt to the spatial heterogeneity and temporal variability which characterize these arid lands. However, due to the inevitable fragmentation of the ecosystem in semi-fenced areas, which largely prevent herd migrations, it can be necessary to ensure population resilience in case of resource shortage. To address this, Tunisia has been able to make significant improvements in the infrastructures and land management of most of the protected areas where antelopes were reintroduced. For

example DNP has seen a new well dug and solar panels are being installed to improve the working conditions of the park staff and field researchers, enabling better monitoring of SHO and other wildlife.

At the same time our teams are able to anticipate emerging challenges such as human wildlife conflict, epidemiological surveillance, prolonged drought, over-predation of calves, and can implement solutions to address issues in a timely manner.

The scimitar-horned oryx population

By December 2016 we estimated that there were approximately 210 SHO across the Tunisian metapopulation. This figure is unchanged from the end of 2015, and whilst it represents the maintenance of a stable metapopulation, the performance of the population in each protected area has varied. In 2016, the population in Dghoumes NP grew by 11%, but the other protected areas saw either 0% growth (Bou Hedma NP), or a decrease in population size (9% decline in Sidi Toui NP and 10% decline in Oued Dekouk Nature Reserve) (2). Whilst these declines may represent natural variability over this time period, we are monitoring these populations closely to ensure threats are not increasing.

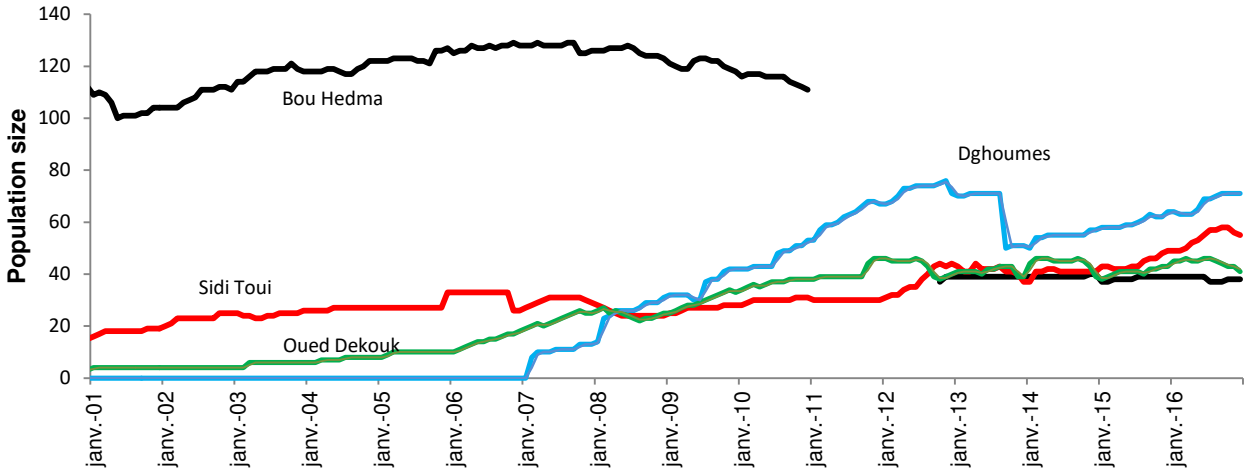

Figure 2. Scimitar-horned oryx population growth in Tunisia since 2001

Sharing experiences, networking and capacity building

Our policy to ensure sustainable conservation means we actively engage with local people, but also build long-term relationships and strengthen the connection within and between Tunisia and Europe. We continually share experience and discuss strategic or management decisions with our Tunisian colleagues and are committed to providing them the opportunity to communicate throughout the international community.

Marie Petretto is actively involved in this task at both a local and national scale. She actively facilitates communication between the park managers and local NGOs, universities and research institutes. Marie regularly contributes to lectures and practical classes for veterinary students in their final study year (four Tunisian students enrolled each year). This joint venture was initiated in 2012 by Marwell, the Direction Générale des Forêts (DGF) and the National Veterinary School of Sidi Thabet and aims to fill a gap in the provision of local veterinary professionals able to manage wild animals. The initiative has been enhanced in 2016 by establishing collaboration with the Faculty of Science if the University of Tunis, in particular with the Populations Ecology department. So far, six Masters students have joined Marwell's team in

the field and contribute to data collection and analyses. Providing future generations of highly skilled personnel, as well as training the current team, will be vital for the anticipated requirements of future metapopulation management.

Figure 3. a) Mr. Abdelatif Ben Ali (left), Bou Hedma NP manager and Mr. Chokri Essaoui (right), Dghoumes NP manager, learning how to use camera-traps; b) Dr. Chawki Najjar and Tunisian Population Ecology Master students (Tunis University) learning how to design a camera-trap survey

Marie has also represented Marwell and the Tunisian project in a number of national and international conferences and workshops during the last twelve months. These include as a speaker or scientific committee member at key meetings including: the Sahelo Saharan Interest Group meeting, the EAZA Conservation Forum, participating in a meeting on integrated conservation and community development in Bou Hedma NP as part of a European Union project, a meeting to develop the management Plan for El Gonna National Reserve (Sfax governorate), an international meeting on the recovery and restoration of the North African ostrich, and the first International Congress of the National Veterinary School.

Figure 4. a) Poster presented by Dr. Marie Petretto at the EAZA Conservation Forum (Fuengirola, Spain, May 2016); b) Group photo of the participants of the second Wildlife Conservation Medicine Workshop (Sousse, Tunisia, July 2016)

Together with the DGF and the support of the Food and Agriculture Organization of the United Nations (FAO), we organized the second workshop on Wildlife and Conservation Medicine, at Friguia Zoo, Sousse on 11-15 July 2016. The event gathered park managers and guards from most of the protected areas involved in Sahelo-Saharan conservation and provided them with lectures and practical sessions on: wildlife medicine, legislation, clinical examination of animals, diseases and capture and trauma/injury care.

Vegetation and habitat monitoring

Since 2011, we have carried out annual vegetation surveys in Dghoumes NP and repeated this survey in 2016. The results are feeding into an existing dataset that will help to develop a locally appropriate monitoring approach to assess the biodiversity improvements relating to the model of small fenced protected areas in semi-arid ecosystems.

Figure 5. Mr. Abdelkader Chetoui and a Tunisian student conducting vegetation surveys in Dghoumes NP

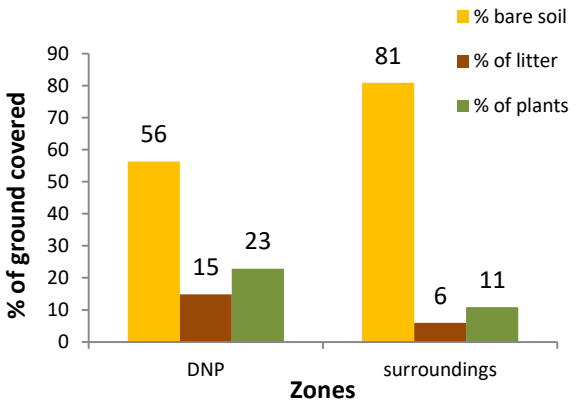

Figure 6. Ground surface cover inside and outside Dghoumes NP between 2011-2016

The preliminary results show improvements in vegetation quality following the establishment of fenced protected areas in areas that have been previously overgrazed (Figure). Reduced grazing pressure in the absence of livestock as well as active habitat restoration appears to contribute to the observed improvements. Continuing this monitoring will contribute to longer timescale trends, which will be necessary to fully validate the results and provide ongoing management advice.

Mammal surveys

Since 2011, we have carried out an annual mammal survey in DNP and did so again in 2016. The survey uses random spoor transects both inside and outside the park to compare diversity levels between the two. Whilst the survey method may have some limitations for assessing the presence, activity and relative abundance of the mammals sharing habitat with the oryx, we repeated the survey in 2016 to enlarge the dataset in order to fully evaluate its uselfulness, and found that the numbers of mammals had increased again after the drought in 2012-14. During these surveys we have taken the opportunity to train volunteers and park staff.

Figure 6. a) Dr. Chawki Najjar, Mr. Abdelkader Chetoui and Mr. Boudhief Yahyaoui **(**park staff) conducting line transects in Dghoumes NP; b) teaching students how to identify the spoor (from left to right: samples of Oryx, Dorcas gazelle, Merion gerbil, Hare and Wild boar faeces)

We conducted a camera trap survey the mountains of DNP following reported observations of free-ranging Barbary sheep. Through our team's efforts we confirmed the presence (or in fact, return) of the species that hasn't been observed for several years[2]. A second camera-trap survey was conducted in September 2016, in combination with transect surveys, with the primary aim of understanding how SHO are using the mountain valleys and the potential for dispersal out of the park. Whilst initial observations highlight the potential for SHO movement and the consequential need to address the management requirements to ensure protection beyond DNP, additional camera trapping is required to meet our aim, and to fully evaluate SHO territories within and beyond the protected area. We anticipate undertaking this work in 2017/2018.

Figure 7. a) Camera-traps are set in the mountains in order to survey how the Oryx use the habitat; b) During the camera-trap survey in the mountains of Dghoumes NP, breeding groups of free-ranging Barbary sheep have been observed

Animal health

Throughout 2016, we continued our work programme to monitor the health of the SHO populations, including monthly visual assessments of body condition along with opportunistic collection of blood and parasite samples, and post-mortem examinations of encountered carcasses. Additionally, we continue to train the guards at Dghoumes, Sidi Toui, Oued Dekouk and Bou Hedma to undertake these surveys and increase their familiarity with best practice. We are developing a strong network of institutions across the country and aim to make veterinary and laboratory support more widespread, appropriate and available. We are encouraging park staff to routinely send the post-mortem remains of key species for examination at the National Veterinary School: this is a substantial logistical challenge but all the stakeholders are engaged in making this happen. We are actively seeking support for the development of veterinary facilities in these areas, so that samples can be adequately stored and processed to ensure reliable diagnoses and effective response.

With that goal in mind, we maintained our provision of specific training on wildlife medicine techniques to Tunisian veterinary students in 2016/2017. In October we were delighted to participate in training a fifth class in partnership with the National Veterinary School of Sidi Thabet.

[2] Petretto *et al*. (2017) Confirmation of free-ranging Barbary sheep *Ammotragus lervia* in Dghoumes National Park and Boukornine National Park, Tunisia. *Oryx,* **volume 51** pp.15

Figure 9. a) Dr. Marie Petretto lecturing at the National Veterinary School (ENMV) of Sidi Thabet, Tunisia; b) Marie teaching wildlife capture to Tunisian veterinary interns

In terms of risk assessment and mitigation, we have raised concerns about the possibly unusual number of mortalities in the adult SHO populations in Oued Dekouk Nature Reserve (NR) and Sidi Toui NP, near the Libyan border. These population declines cannot solely be explained by a lack of resources or management approach and require closer attention. There is an increased risk of disease transmission from livestock, arthropod vectors and carnivores in this area. We are working with our local partners to assess the risks and find the best way to screen the herds in the event of an outbreak.

Ecosystem restoration

In 2016, we also continued to support the biodiversity restoration in the SHO protected areas. Therefore, we have provided technical support to other species reintroduction such as the endangered North-African ostrich (*Struthio camelus camelus*) in DNP and Sidi Toui NP, the emblematic Barbary sheep (*Ammotragus lervia*) in Oued Dekouk NR and DNP, and the threatened Slender-horned gazelle (*Gazella leptoceros*) in Sidi Toui NP. We routinely monitor these animals, as well as other key species sharing habitat with the SHO, in order to document and evaluate the interspecific relationships that underpin vital ecosystem functions.

Figure 10. The reintroduction of scimitar-horned oryx has catalyzed the restoration of the arid-land ecosystems and the reintroduction of other emblematic species: in DNP and Sidi Toui NP, the North African ostrich has recently joined the SHO in their natural habitat; further reintroductions will happen in other protected areas in 2017.

Proposed activities for 2017 and beyond.....

By mid-2017 we are proud to report that we have made significant progress against the activities we planned for the new phase of programme in Tunisia:

- Refining and standardisation of the monitoring and approaches for management
- Biodiversity monitoring in Dghoumes National Park
- Research and capacity building in key protected areas

We are seeking additional resources to improve and expand camera-trap surveys. A minimum of 20 additional cameras is needed to simultaneously survey the area and facilitate identification of individual SHO. These valuable data will improve our understanding of how the SHO use their habitat, allow us to assess the carrying capacity of the area and develop appropriate management strategies with the Tunisian government.

Increasing our engagement with park managers and their staff is vital to successful sustainable management of the SHO metapopulation in Tunisia. We would like to produce communication and education material for stakeholders working in the parks, and recruit an additional local team member to produce a newsletter where we can share recommendations, case studies, success stories and results to the staff in all of the relevant protected areas. This will reinforce awareness of what has already been achieved as well as developing a sustainable tool for local capacity building and expertise sharing.

There is also an urgent need to carry out further veterinary examinations of SHO mortalities in Eastern Tunisia. We are seeking funds for basic veterinary facilities, starting with a solar powered cold store for samples collected from the field.

Finally, we see the immense value in providing opportunities for young Tunisian veterinary and ecology graduates to get experience of working in the field at key sites. As the next generation of conservationists in Tunisia, it is important that students have support to travel to, stay and work in these remote field sites to better understand their role now and in the future.

In 2017/2018 we are planning the following activities:

1. Publish results on the factors affecting SHO populations, such as predation and ecosystem quality and change.
2. Continue monitoring SHO in Dghoumes National Park as a case-study of best practice, and an example of effective protected area management, providing a basis from which to evaluate the efficacy of the wider national management plan.
3. Expand our monitoring programme to include more extensive health screening including routine post-mortem examinations
4. Continue training to improve skills and build capacity for wildlife conservation in Tunisia
5. In partnership with Tunisian government, develop a national meta-population management plan for SHO
6. Recruit a Tunisian communication officer who can produce information resources to inform key stakeholders
7. Publish a vegetation catalogue for DNP, and a “tracks & signs guide” for Tunisia
8. Hold a workshop for senior park managers on standardized monitoring techniques and developing management planning
9. Develop wildlife veterinary capacity by working with and training local students

Costs & Funding Proposal

The annual costs of operations in Tunisia are underwritten by Marwell Wildlife, maintaining our presence in-country, and ensuring the continuity of work that is essential for long-term success. We have the opportunity and ability to expand our work and enhance conservation impact and are seeking funding for delivery of specific projects. Hence, we would very much welcome the support of EEP partners who share our goals of achieving sustainable management of reintroduced scimitar-horned oryx, and the restoration of their habitat and local biodiversity. By supporting local development and promoting the motivation and the skills of the Tunisian youth, our program could provide great and inspiring stories to emphasize the contribution of the partners of our work: should it be appreciated, we would be happy to increase the working time of a local Communication Officer who could regularly share news for our partners' audience.

Cost item	Cost basis	£
Implementation of oryx meta-population plan		
Workshop for senior protected area managers	Venue, travel, accommodation & subsistence for Tunisian delegates (30 attendees + speakers)	5,000
TOTAL		**5 000**
Standardising oryx and habitat monitoring		
Tunisian project manager/ trainer in Dghoumes	120 days @ £25 per day (salary & expenses)	3 000
Monitoring 4 protected areas by Marwell team	Mileage: 2,000km/m @ 0.36p per km	8 640
Camera traps & consumable (mammal surveys)	20 x camera traps @ £250 per unit	5 000
TOTAL		**16 640**
Integrated wildlife & livestock health monitoring		
SHO chemical immobilisation (emergency care, diagnosis and management purpose)	10 oryx @ £60 per oryx (drugs, consumables)	600
Sampling and analyses	*Ad hoc* parasitology, histology, serology etc.+ storage and shipping	1 000
Treatments	*Ad hoc* antibiotic, anti-parasitic, vaccine depending on test results	400
Solar-powered cold store	Refrigeration unit + insulated container	10,000
TOTAL		**12 000**
Publishing a newsletter for park staff, producing communication media for Zoo audience		
Tunisian communications officer	120 days @ £15 per day	1 800
Information dissemination	Print newsletter 4 issues per year, 500 copies each (8 protected areas) / social media outputs	1 000
TOTAL		**2 800**
Research on the restoration of the arid steppe ecosystem		
Stipend for Tunisian trainees and local animals trackers	2 pers. per protected areas, 8 protected areas, 30 d/m, 5TND/d i.e. 28,800 TND + taxes	9 000
Transport cost	£ 100/mo	1 200
TOTAL		**10 200**
Overall Total		**46 640**