

CHANGES IN THE NUMBER OF BREEDING PAIRS, NEST DISTRIBUTION AND NESTING TREES USED BY THE LAPPET-FACED VULTURE *TORGOS TRACHELIOTUS* IN THE MAHAZAT AS-SAYD PROTECTED AREA, SAUDI ARABIA

MOHAMMED SHOBRAK¹

¹Biology Department, Science College, Taif University, Taif, Saudi Arabia. Email: mshobrak@gmail.com

From 1992 to 2003, the number of Lappet-faced Vulture *Torgos tracheliotus* pairs nesting in Saudi Arabia's Mahazat as-Sayd Protected Area, which was established in 1989, increased from 6 to 37. The distribution of nests concentrated in two small core areas in the east and south-east (1992 and 1995) changed to a more even pattern across the protected area (2003). Concomitantly, the tree species used for nesting changed from being almost exclusively *Maerua crassifolia* (1992-1998) to *Acacia tortilis*. The fence around the protected area reduces disturbance, which is a factor affecting the breeding success of these vultures; the increase in the number and distribution of nests is probably a response to effective protection of the area. Changes in nest-tree species probably reflect their general availability, as *Acacia tortilis* is the dominant species in Mahazat, whereas *Maerua crassifolia* is concentrated in the reserves' eastern part.

Key words: vultures, breeding success, Mahazat, protected area, *Maerua crassifolia*, *Acacia tortilis*, *Torgos tracheliotus*

INTRODUCTION

Among the old world vultures, the Lappet-faced Vulture *Torgos tracheliotus* is one of the most poorly studied species and little detailed work has been done on its breeding biology in Arabia, where it is represented by the subspecies *T.t. negevensis* (Jennings and Fryer 1984; Newton and Shobrak 1993). The first information on its breeding biology was published by Newton and Newton (1996), and recently Shobrak (2004) published detailed information on the parental investment made by adult Lappet-faced Vultures during the breeding season in the Mahazat as-Sayd Protected Area in Saudi Arabia.

Populations of the other two subspecies – *T.t. tracheliotus* and *T.t. nubicus* – have been shrinking in numbers and range in Africa (Mundy *et al.* 1992); globally, the Lappet-faced Vulture *Torgos tracheliotus* is considered threatened, with IUCN status Vulnerable; its small population is declining owing to poisoning and persecution (Shobrak 2003; BirdLife International 2007, 2008). Nevertheless, according to Jennings (2010), there are probably 600 breeding pairs of *T. tracheliotus negevensis* in the Arabian Peninsula. Indeed, the species is almost common in the plains of west-central Saudi Arabia, 19° N (Newton and Shobrak 1993; Shobrak 2003). Oman has a small breeding population (Gallagher 1982), numbers in eastern Yemen are unknown (Jennings 2010), and breeding populations no longer exist in Israel, Jordan and the United Arab Emirates (Leshem 1984; Khoury 2000; Cunningham 2002). Thus, based on the number of nests recorded in different parts of Saudi Arabia, the Kingdom probably hosts the only viable population of the subspecies *negevensis* in the Middle East (Shobrak 2003). Accordingly,

the present work was aimed at studying the changes in the number of breeding pairs, nest distribution and nesting trees utilized by the Lappet-faced Vulture *Torgos tracheliotus* in the Mahazat as-Sayd Protected Area, Saudi Arabia, between 1992-2003.

STUDY AREA AND METHODS

The Mahazat as-Sayd Protected Area (hereafter 'Mahazat' or 'the Reserve') is a 2,245 sq. km fenced area located on the arid plains of western Saudi Arabia, 170 km north-east of Taif (Fig. 1). It has been protected since 1989 mainly as a reintroduction site in Saudi Arabia for the Arabian Oryx *Oryx leucoryx*, Arabian Sand Gazelle *Gazella subgutturosa marica*, Macqueen's Bustard *Chlamydotis macqueenii* and Common Ostrich *Struthio camelus* (Greth and Schwede 1993; Haque and Smith 1994, 1996). The English name of the birds species are from Gill and Wright (2006), whereas the scientific names are quoted from Dickinson (2003). The English and scientific names for the mammals species were quoted from the IUCN SSC Antelope Specialist Group (2008). Owing to the perimeter fence, Bedouins and their livestock have no access to the Reserve. The majority of the substrate in the Reserve is open sandy gravel. The climate is tropical and arid; mean monthly minimum and maximum ambient temperatures are 9-25 °C respectively in winter and 21-46 °C in summer. Rainfall about 15-240 mm annually occurs between March and May (Shobrak 2001). *Acacia tortilis* is the most common shrub or tree species in the area, *Fagonia indica* and *Indigofera spinosa* are the most common herbs, and *Panicum turgidum* and *Stipagrostis* spp. are the most common grasses (Shobrak 2004).

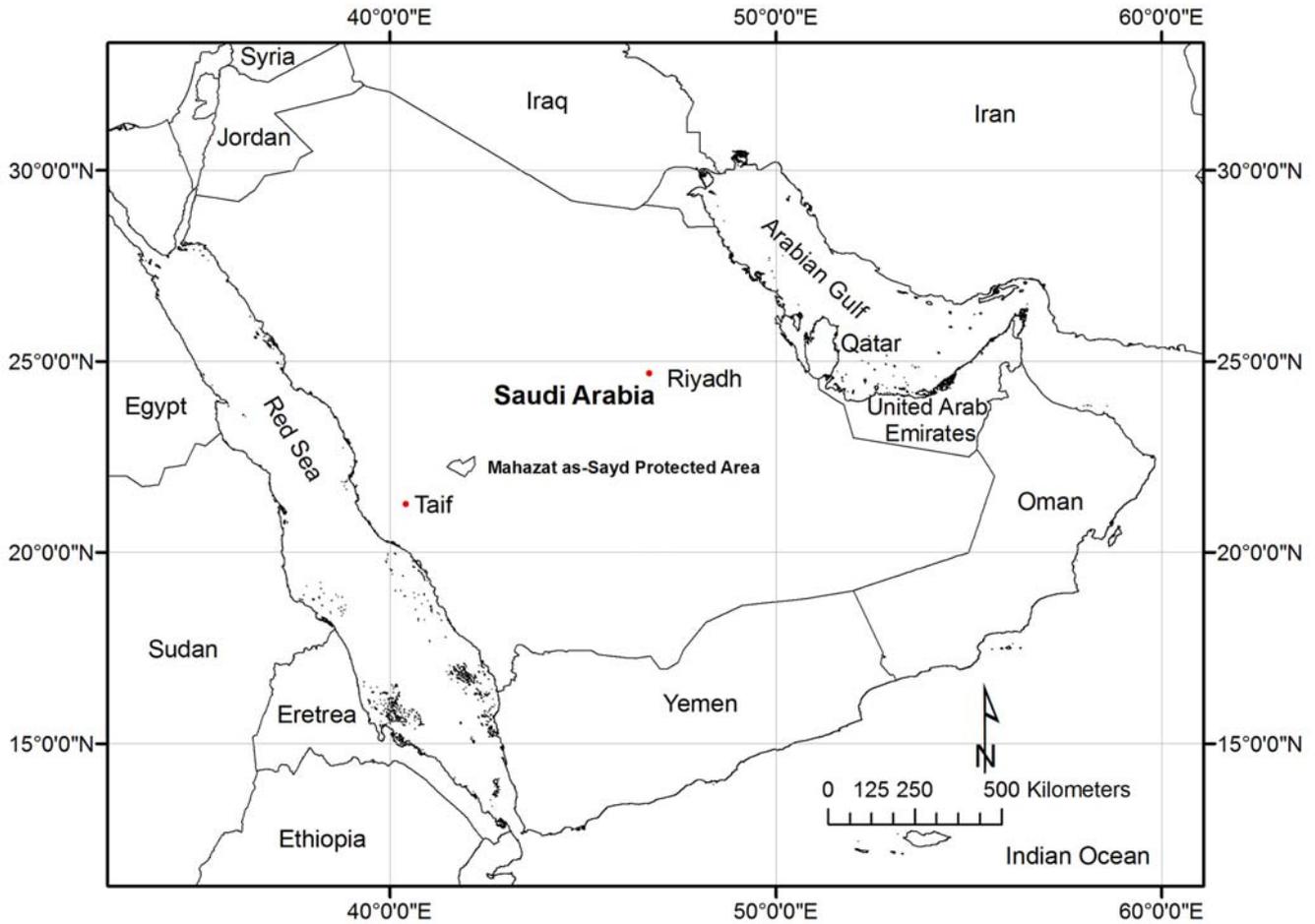


Fig. 1: Map showing the location of the Mahazat as-Sayd Protected Area

Lappet-faced Vulture nests were counted in the Mahazat from 1992 to 2003. Nests without eggs were excluded and only active nests were used in this study. Data from 1992 to 1995 on nesting sites in the Reserve have been published elsewhere (Newton and Newton 1996; Shobrak 1996). In 1996 no data were available, and in 1997 in my absence the nests were counted by rangers, who missed certain

information on locations, so data on inter-nest distances were not recorded. Nest sites were located through either ground or aerial surveys, or from information received by other researchers and rangers working in the area. Outside the Reserve, nests were identified during aerial surveys in 1993, 1998 and 2003 to locate and count the livestock in the 20 km belt around the perimeter fence. Ground surveys to locate nests outside the Reserve were carried out once or twice in a year. Within the Reserve, ground surveys were carried out 1-3 times a month during the breeding season (December-June), as some nests could only be detected when the chick was two months old and standing up. Nest locations were recorded with GPS units. Inter-nest distances were calculated using ArcView 3.1 software for nests located between 1998 and 2003.

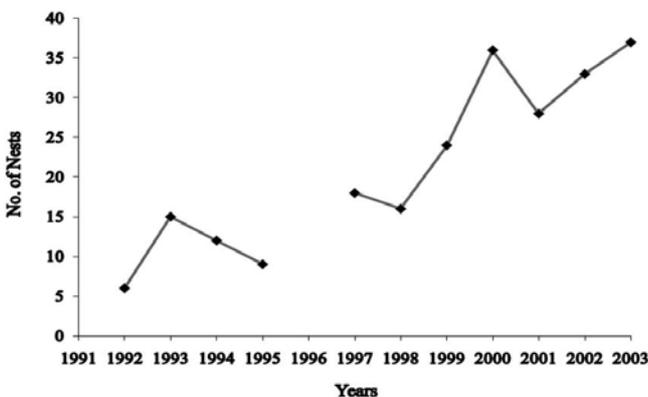


Fig. 2: Number of Lappet-faced Vulture nests recorded in the Mahazat as-Sayd Protected Area from 1992 to 2003

RESULTS

The number of Lappet-faced Vulture nests in the Reserve increased from 6 in 1992 to 37 in 2003 (Fig. 2). The maximum number of active nests located in the Reserve

BREEDING SUCCESS OF LAPPET-FACED VULTURE IN MAHAZAT AS-SAYD PROTECTED AREA

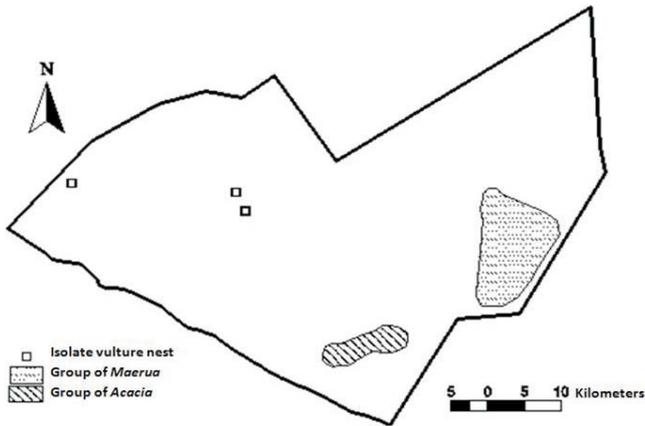


Fig. 3: The distribution of Lappet-faced Vulture nests in the Mahazat as-Sayd Protected Area from 1992 to 1995

during the monitoring period was 37 in 2003, with a mean distance of 3.11 ± 1.61 km between nests. Changes in the distribution of nests and the nesting trees were also recorded (Figs 2 and 3). Between 1992 and 1995 the nests were found either in one of two core nesting areas or on isolated single trees (Newton and Newton 1996; Shobrak 1996). The first (eastern) core area contained the largest number of nests, all on *Maerua crassifolia* trees (30 nests within 40 sq. km), with an average height for nests of 4.6 ± 0.87 m. The second (southern) core area consisted of eight nests, all on *Acacia tortilis* trees within an area of 5 sq. km, with an average height for nests of 3.7 ± 0.52 m. The isolated nests away from the two core areas were all on *Acacia tortilis* trees (Fig. 3, Newton and Newton 1996). However, from 1998 to 2003 the distribution of nests in the reserve changed as nests became more widespread, with a mean inter-nest distance of 3.90 ± 1.61 km, $n = 174$ (Fig. 4).

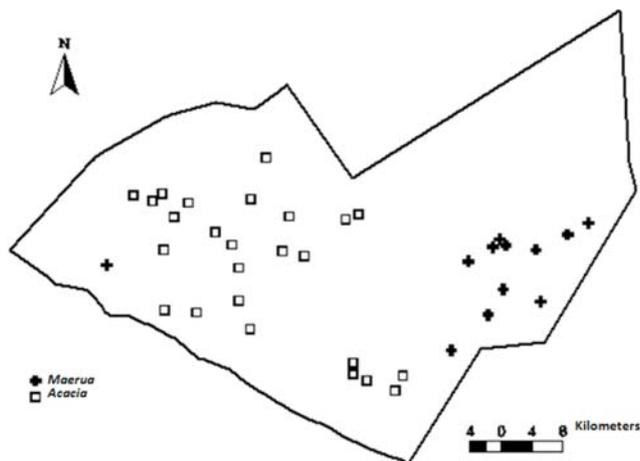


Fig. 4: The distribution of Lappet-faced Vulture nests in the Mahazat as-Sayd Protected Area in 2003

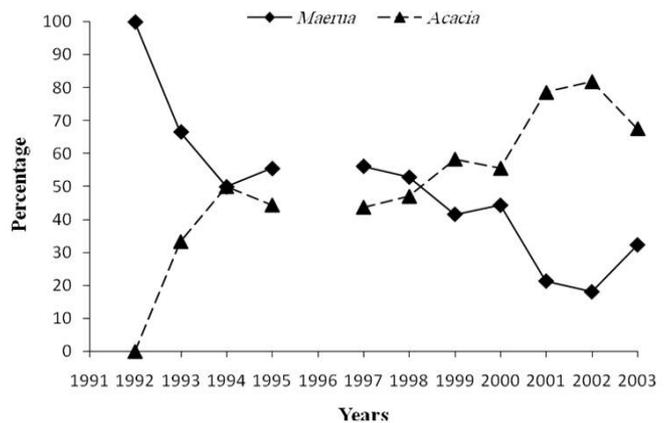


Fig. 5: The proportion of annual variation in two tree species used by nesting Lappet-faced Vultures in the Mahazat as-Sayd Protected Area

Lappet-faced Vulture nests have a bulky structure, and are often visible from a considerable distance on the *Maerua* trees, but those in *Acacia tortilis* can be well-hidden in the canopy (Newton and Shobrak 1993). The number of nests on *Acacia* trees increased over 12 years, while the number of nests on *Maerua* trees decreased (Fig. 5). In addition, between 1998-2003 there was a significant difference in the distance between nests in different years ($F_{5,106} = 3.9, P < 0.003$) and also within the same species of nesting trees (*Acacia vs Acacia*, $F_{4,77} = 2.88, p < 0.028$; *Maerua vs Maerua*, $F_{4,35} = 6.17, P < 0.001$) (Fig. 6). Moreover, comparing the height of nests used by Lappet-faced Vultures there is no significant difference between nests occurring in *Maerua* and *Acacia* during 1992-1995 and 1998-2003 (1992-1995, t -test $t_{33} = 3.8, P < 0.001$; 1998-2003, t -test, $t_{42} = -2.30, P < 0.027$). In addition, the distance between some active nests was as short as 1.4 km in the last three years of the study, whereas within the core areas,

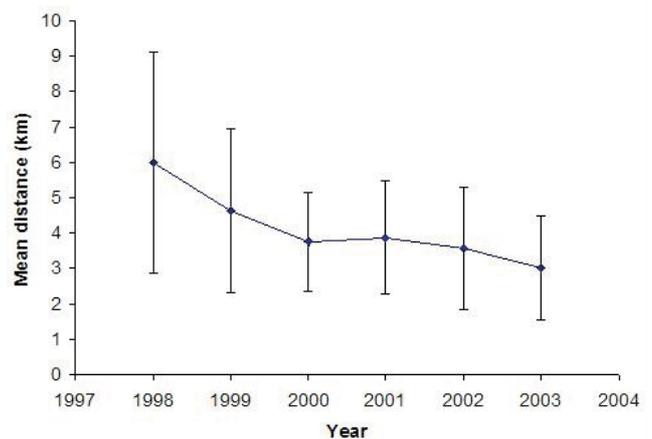


Fig. 6: The mean distance between nests located between 1998 and 2003

nest of adjacent pairs were fairly evenly spaced, nearly always greater than 2 km apart.

As nesting pairs are not marked, re-use of nests by the same pairs was difficult to determine. However, it was presumed that a nest established near the previous year's nest belonged to the same pair. Out of 174 nests found over the lifetime of the study, 121 were new.

Only two nests were found outside the Reserve, one in 1993 to the north-east and the other in 1999 on a *Maerua* tree. The 1993 nest was recorded during an aerial survey and subsequently found to hold a 40-50 day old chick. Five non-active nests, all in *Maerua* trees, had large stones in them. In 1994, no active nests were found outside the Reserve, and the 1993 nest-site had been abandoned.

DISCUSSION

Newton and Newton (1996) showed that the availability of suitable nest-trees in Mahazat does not alone account for the Lappet-faced Vulture's distribution there, and that other factors seem to be involved. The increase in the use of *Acacia tortilis* trees for nesting found in this study is probably related to a combination of low levels of disturbance in the Reserve and the availability of trees for nesting purposes. Moreover, an aerial survey carried out in May 1990 estimated a recovery rate of 6.06% for *Acacia* and 0.03% for *Maerua*. In addition, the density of *Acacia* was higher than *Maerua*, with a mean of 553 *Acacia* trees/ha and 0.16 *Maerua* trees/ha (Gillet and Launay 1990). The aerial survey also showed that there was increase in density of *Acacia* from north to south of the Reserve, with highest density (2,905 *Acacia*/ha) located in the *Acacia* core area (Fig. 3), and minimum density (21 *Acacia*/ha) in the north-west (Gillet and Launay 1990). Furthermore, during a 2008 ground census Cunningham (2009) estimated the density of *Acacia* as 120/ha as against *Maerua* <1/ha. Regardless of difference in the densities estimated by these two studies, *Acacia* is the more dominant tree in the Reserve.

The reasons for concentration of nests in the two core areas in the early period of the study were difficult to determine, as monitoring of nests started only after the establishment of the Reserve. However, the high densities and height of trees in these areas, compared to the rest of the Reserve (owing to the terrain and the small *wadis* in these areas), probably explain this clustering of nests, along with the low level of disturbance to breeding vultures in the Reserve (Gillet and Launay 1990; Newton and Newton 1996; Shobrak 2005; Cunningham 2009). In addition, wood-cutting outside the Reserve has an impact on the density and height of trees, compared to inside the Reserve.

The security of the area together with an abundant food supply, in and around Mahazat, are probably the main factors responsible for the increase in vultures nesting in the Reserve (Shobrak 2003). Arabian gazelles and Oryx, suffering mortality during droughts (Seddon *et al.* 2003; Ostrowski and Williams 2006; Islam *et al.* 2007), were the main food. Even outside the Reserve, Shobrak (2000) showed that only 35% of the carcasses were utilized by other avian species and mammals, which means that there is an abundant food supply for the vultures.

In general, disturbance of nesting sites is probably one of the major reasons for the decline of raptors (Newton 1979; Mendelssohn and Leshem 1983; Mundy *et al.* 1992; Shobrak 2003). Outside the Reserve there are enough trees to support breeding of Lappet-faced Vultures, but the large number of Bedouin camps, which use these trees and surrounding areas, must have increased the levels of disturbance on breeding birds. Unfortunately, the vulture's large size causes local people to think that this bird will attack their livestock. There is clearly a need for an awareness campaign to explain that the species poses no threat to livestock and needs conservation.

Suitable nesting trees outside the Reserve are surrounded by fences for corralling domestic herds overnight (Shobrak 2003, 2004). In all non-active nests located outside the Reserve large stones were found inside the nests and between the branches, suggesting human persecution or at least disturbance of nesting vultures. Jennings and Fryer (1984) reported that local shepherds try to destroy eggs by throwing stones into the nests. In Israel, Lappet-faced Vultures also suffered from disturbance at nest sites because of the new settlements and military activity near the birds' nesting grounds (Bruun 1981; Mendelssohn and Leshem 1983).

Mundy *et al.* (1992) suggested that in preferred habitat the species nests in a random rather than regular fashion, and that a pair of vultures may make a new nest each year, 70 m to nearly 4 km from the previous site. In Zimbabwe, the average inter-nest distance of 64 nesting sites among 25 pairs was 1.2 km in one year. By contrast, the inter-nest distance of the same pairs in the following year was double, at 2.9 km (Mundy *et al.* 1992). In one year in the Serengeti, 11 of 25 pairs built a new nest, whereas in Zululand (South Africa) 11 nests and pairs have remained in the same tree over a 13-year period (Mundy *et al.* 1992). What drives these differing behaviours is not known, but similar results to the Serengeti study were recorded in Mahazat, with variations in the distribution of nests and a mean distance of 3.11 ± 1.61 km between nests.

All nests in the Reserve were located in open areas with large trees suitable for breeding. However, these trees

are mostly found in the main *wadis* and depressions where water remains for longer periods following rainfall. These conditions also encourage a good vegetation cover, and this attracts the local shepherds and their livestock. Lappet-faced Vultures were therefore attracted to nest in the areas which had the highest levels of disturbance (Shobrak 2003). All shepherds interviewed said that they used the largest trees in the area for shade for themselves and their livestock, and were heavily dependent on this shelter. The largest trees that are most suitable for nesting by Lappet-faced Vultures are therefore likely to be sites of intense human disturbance, which will discourage birds from using them. Moreover, most shepherds questioned considered that vultures might attack their livestock, and they did not encourage nests near camps (Shobrak 1996). Cunningham and Cunningham

(1999) found similar perceptions by farmers towards vultures in Namibia.

ACKNOWLEDGEMENTS

My deep gratitude and thanks to HH Prince Bander bin Saud, the Secretary General of the Saudi Wildlife Authority (SWA), for his support and encouragement. Also I am grateful to Mr. Ahmad Bouq, Director, National Wildlife Research Center (NWRC), for his support and useful discussion. I thank all rangers staff at Mahazat as-Sayd Protected Area for their help during the field work. Special thanks and appreciation to Dr. Nigel Collar are due for his corrections and suggestions in the manuscript. I am also grateful to Jacky Judas for correction in the first draft of the manuscript.

REFERENCES

- BIRDLIFE INTERNATIONAL (2007): Species factsheet: *Torgos tracheliotus*. Downloaded from <http://www.birdlife.org> on 28/11/2007.
- BIRDLIFE INTERNATIONAL (2008): The BirdLife checklist of the birds of the world, with conservation status and taxonomic sources. Version 1. Downloaded from http://www.birdlife.org/datazone/species/downloads/BirdLife_Checklist_Version_1.zip [.xls zipped 1 MB].
- BRUNN, N. (1981): The Lappet-faced Vulture in the Middle East. *Sandgrouse* 2: 91-95.
- CUNNINGHAM, P.L. (2002): Vultures declining in the United Arab Emirates. *Vulture News* 46: 8-10.
- CUNNINGHAM, P. (2009): Nesting tree utilisation by Brown-necked Ravens *Corvus ruficollis* in west central Saudi Arabia. *Sandgrouse* 31: 68-72.
- CUNNINGHAM, P.L. & A.I. CUNNINGHAM (1999): Observations of vultures at domestic stock lamb carcasses. *Lanioturdus* 32(2/3/4): 7-9.
- DICKINSON, E.C. (ED.) (2003): The Howard and Moore Complete checklist of the Birds of the World. 3rd edition. London; Christopher Helm. 1039 pp.
- GALLAGHER, M.D. (1982): Nesting of Lappet-faced Vulture *Torgos tracheliotus* in Oman. *Bull. Brit. Orn. Club* 102: 135-139.
- GILL, F. & M. WRIGHT (2006): Birds of the World: Recommended English Names. Princeton NJ: Princeton University Press.
- GILLET, H. & C. LAUNAY (1990): Flora analysis of the Mahazat as-Sayd vegetation. Taif, Saudi Arabia: NWRC. 56 pp.
- GRETH, A. & G. SCHWEDE (1993): A brief history of the reintroduction of the Arabian Oryx *Oryx leucoryx* in Saudi Arabia. *Internatn. Zoo Yb.* 32: 73-81.
- HAQUE, M.N. & T.R. SMITH (1994): Reintroduction of Arabian Sand Gazelle *Gazella subgutturosa marica* in Saudi Arabia. *Biol. Cons.* 76: 203-207.
- HAQUE, M.N. & T.R. SMITH (1996): Re-introduction of Red-necked ostriches in Saudi Arabia. *Re-introduction News* 9: 5.
- ISLAM, M.Z., A. BOUG, S. ANAGARIYAH, K. ISMAIL, E.R. ROBINSON & O.B. MOHAMMED (2007): Catastrophic die-off of reintroduced animals in Mahazat as-Sayd Protected Area in arid central Saudi Arabia. National Wildlife Research Center, King Khalid Wildlife Research Center and National Commission for Wildlife Conservation and Development, Saudi Arabia.
- IUCN SSC Antelope Specialist Group (2008): *Gazella subgutturosa* ssp. *marica*. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <www.iucnredlist.org>. Downloaded on 22 January 2012.
- JENNINGS, M.C. & R.N. FRYER (1984): Birds of Saudi Arabia. The occurrence of the Lappet-faced Vulture *Torgos tracheliotus* (J.R. Forster) in the Arabian Peninsula, with new breeding records from Saudi Arabia. *Fauna of Saudi Arabia* 6: 534-545.
- JENNINGS, M.C. (2010): Atlas of the breeding birds in the Arabia Peninsula. Frankfurt: Senckenberg Gesellschaft für Naturforschung, and Riyadh: King Abdulaziz City for Science and Technology. *Fauna of Arabia* 25: 250-253.
- KHOURY, F. (2000): Status of vultures in Jordan. *Vulture News* 43: 30-36.
- LESHEM, Y. (1984): The rapid population decline of Israel's Lappet-faced Vulture. *Internatn. Zoo Yearbook* 23: 41-46.
- MENDELSSOHN, H. & Y. LESHEM (1983): Observations on reproduction and growth of old world vultures. Pp. 214-241. In: Wilbur, S.R. & J.A. Jackson (Eds): Vulture Biology and Management. Berkeley: University of California Press.
- MUNDY, P., D. BUTCHART, J. LEDGER & S. PIPER (1992): The Vultures of Africa. London: Academic Press. 464 pp.
- NEWTON, I. (1979): Population ecology of raptors. Berkhamsted, UK: T. and A.D. Poyser. Pp. 399.
- NEWTON, S. & A. NEWTON (1996): Breeding biology and seasonal abundance of Lappet-faced Vultures *Torgos tracheliotus* in western Saudi Arabia. *Ibis* 138: 675-683.
- NEWTON, S.F. & M. SHOBRAK (1993): The Lappet-faced Vulture *Torgos tracheliotus* in Saudi Arabia. *Proc. VIII Pan-African Orn. Congr.* 111-117.
- OSTROWSKI, S. & J.B. WILLIAMS (2006): Heterothermy of free-living Arabian Sand Gazelles (*Gazella subgutturosa marica*) in a desert environment. *J. Exper. Biol.* 209: 1421-1429.
- SEDDON, P.J., K. ISMAIL, M. SHOBRAK, S. OSTROWSKI & C. MAGIN (2003): A comparison of derived population estimate, mark-resighting and distance sampling methods to determine the population size of a desert ungulate, the Arabian Oryx. *Oryx* 37: 286-294.
- SHOBRAK, M. (1996): Ecology of the Lappet-faced Vulture *Torgos tracheliotus* in Saudi Arabia. Ph.D. thesis, University of Glasgow, Glasgow, Scotland, UK. Pp. 169.
- SHOBRAK, M. (2000): The role of avian scavengers in locating and exploiting carcasses in central Saudi Arabia. Pp. 213-224. In: Chancellor, R.D. & B.-U. Meyburg (Eds): Raptors

BREEDING SUCCESS OF LAPPET-FACED VULTURE IN MAHAZAT AS-SAYD PROTECTED AREA

at risk. Berlin: World Working Group on Birds of Prey and Owls.

SHOBRAK, M. (2001): Posturing behaviour of Lappet-faced Vulture *Torgos tracheliotus* chicks on the nest plays a role in protecting them from high ambient temperatures. *Asian Raptor Bulletin* 2: 7-9.

SHOBRAK, M. (2003): Vulture in Saudi Arabia. *Vulture News* 48: 20-23.

SHOBRAK, M. (2004): Parental investment of the Lappet-faced Vulture during the breeding. Pp. 111-125. *In*: Chancellor, R.D. & B.-U. Meyburg (Eds): *Raptors worldwide*. Berlin: World Working Group on Birds of Prey and Owls.

SHOBRAK, M. (2005): Breeding success of Brown-necked Ravens *Corvus ruficollis* in the Mahazat as-Sayd Protected Area, Saudi Arabia. *Sandgrouse* 27: 152-157.

