

Special Report

## Hunted by Falcons, Protected by Falconry: Can the Houbara Bustard (*Chlamydotis undulata macqueenii*) Fly into the 21st Century?

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**Abstract:** This article examines the traditional relationship between the houbara bustard (*Chlamydotis undulata macqueenii*) and desert falconry in the Middle East and reviews the factors causing the decline of houbara populations. Hunting with falcons, industrial development, changes to traditional agriculture, political instability, subsistence hunting, and wars are important factors combining to threaten this species throughout its range. Many initiatives to conserve the houbara bustard in the Middle East are supported by Arab falconers. The role of national wildlife conservation agencies in the Middle East in establishing captive breeding and restoration programs, habitat protection, ecological studies, biomedical research, local hunting organizations, falcon research groups, sustainable use in range countries, public awareness programs, rehabilitation projects, and international agreements to conserve the houbara bustard are described.

**Key words:** falconry, houbara bustard, *Chlamydotis undulata macqueenii*, conservation, captive breeding

### Introduction

A season for rejoicing, the rains are close at hand and the hubara have arrived. They are verily like the manna of old, Allah's reward to those who have endured the summer heat.<sup>1</sup>

The houbara bustard (*Chlamydotis undulata*) is the most common and widespread member of the bustard family, living in arid countries from the Canary Islands in the west, through North Africa and the Middle East, to Pakistan and India, north into Kazakhstan, and as far east as China and central Mongolia (Fig. 1).<sup>2</sup> There are three distinct subspecies of houbara: the north African race (*C. undulata undulata*), the Canary Islands race (*C. u. fuertaventurae*), and the Asian race (*C. u. macqueenii*), although a recent investigation has suggested that the *macqueenii* and *undulata* populations should be

separated into different species.<sup>3</sup> The Asian subspecies, also known as MacQueen's bustard, is the bird considered in this report.

The houbara populations in Central Asia are migratory, wintering from Pakistan to Arabia, where they overlap with local breeding populations in the Arabian peninsula, such as the ones in Saudi Arabia.<sup>4,5</sup> These houbara are presumed to migrate to find new food because of the harsh winters of their breeding grounds, and it is these wintering birds that are the main quarry of Arab falconers.

### Traditional Falconry in the Middle East

The hubara appears on the eastern and north-eastern seaboard of the Arabian Gulf in about October in each year, and the birds continue to come until about April, when they gradually disappear to cooler climes. Round about Zubair, Kuwait, and further south as far south as Qatar, the birds are very plentiful throughout the winter, and many thousands of birds are each season killed for food by local Arabs. In Kuwait, the Shaikh generally bags about two thousand birds every cold weather, and the combined

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**Figure 1.** The houbara bustard—the most political of gamebirds in Arabia and central Asia.

members of the Al Sa'ud get about the same number in the Najd proper, as do the Shaikhs of Bahrain.<sup>1</sup>

Falconry and the lore of falcons are deeply ingrained in Arab traditions and culture, and falcons have had a central and respected place in Middle

Eastern society for at least 1,000 years (Fig. 2). The reasons for the decline of the houbara bustard and the measures being taken to conserve the species cannot be discussed without understanding the unique relationship between Arab falconry and its favored prey, the houbara. Descriptions of hunting houbara with falcons in Arabia more than 700 years ago exist in translations of the chronicles of the legendary Ousama.<sup>6</sup> The first Arab reported to have trained falcons and introduced falconry into Arabia was Al Harith bin Mu'awiyah bin Thawr bin Kindah.<sup>7</sup> For hundreds of years, Arabs have used wild-caught and carefully trained falcons to catch quarry such as desert hares (*Lepus capensis*), stone curlews (*Burhinus oedicephalus*), and houbara bustards.<sup>8</sup> However, in the traditional life of the peninsula, it was the houbara that was most important as a source of food for humans because each winter the numbers of resident birds were swelled by large numbers of birds moving into the peninsula from central Asia.<sup>1</sup>

Traditionally, the falcon most commonly used by Arab falconers is the saker falcon (*Falco cherrug*) of eastern Europe and central Asia, which migrates across the Arabian peninsula to winter in East Africa.<sup>9</sup> Trappers catch the sakers during their passage across Arabia, especially favoring the larger females in their first winter of life, when they are easier to train.<sup>10</sup> Peregrine falcons (*Falco peregrinus*) and, less commonly, lanner falcons (*Falco biarmicus*) are also used. The training takes about 3 weeks, during which the falcon, through constant handling and food rewards, becomes habituated and eventually



**Figure 2.** Falconry is a traditional pursuit in Arabia.

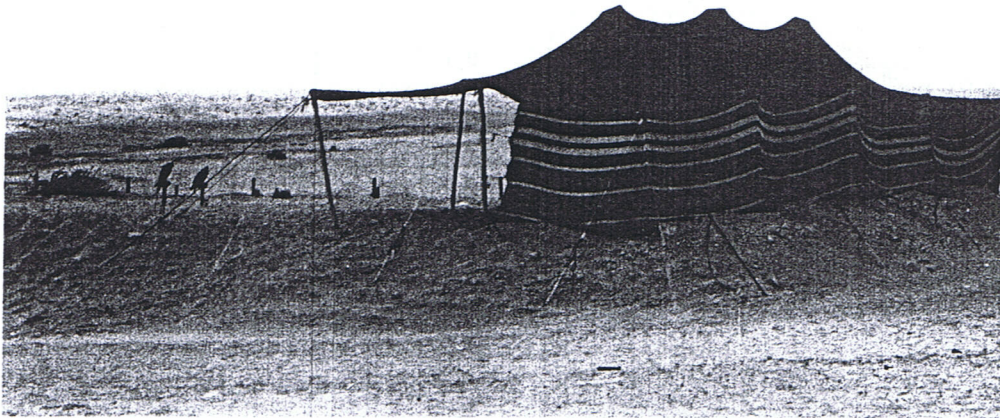


Figure 3. Typical hunting camp scene at sunset in the deserts of Arabia.

will fly free and return to the falconer. A wild falcon would rarely, if ever, catch a free-living houbara bustard. Houbara can be up to twice the size of a falcon, which would normally feed on species smaller than itself. During training, the falcon is allowed to catch a houbara or another similar sized bustard species that has been disabled by the falconer.<sup>8,11</sup> This practice lets the falcon develop the confidence that will be necessary if it is to catch a free-living houbara during hunting trips. Allen described how a falcon is trained to hunt houbara with the use of "bagged" quarry<sup>8</sup>:

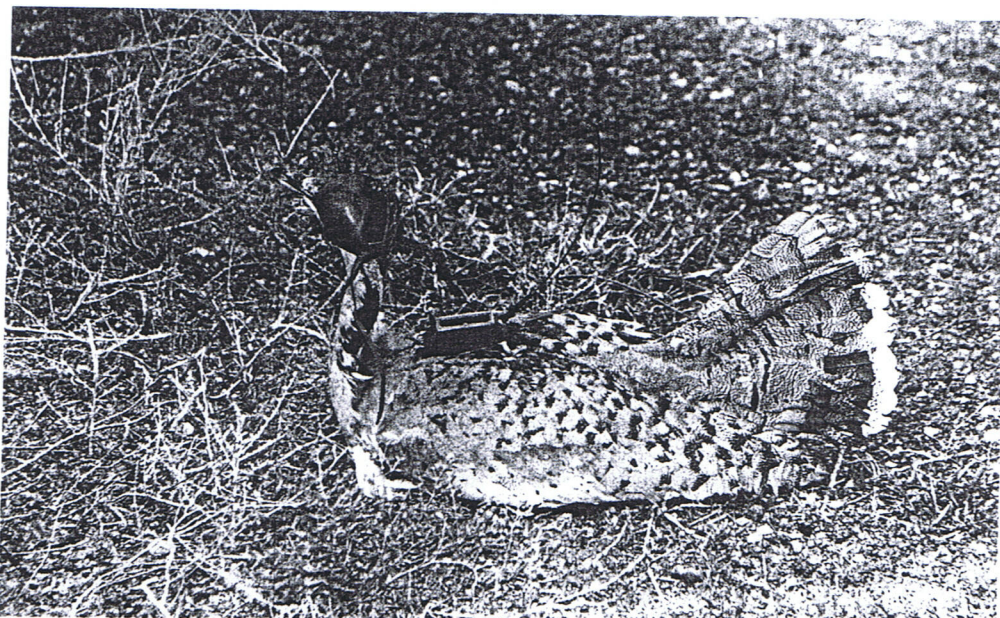
... one of last season's hawks is used to catch, but not kill a houbara, or a houbara is winged with a shotgun. If too much bounce is left in the bird a few primary feathers are removed from one wing and the falcon is introduced to the disabled houbara in an open space.

In former times, a typical hunting party comprised a small group of men and half a dozen falcons searching for houbara from camel back. During his travels in Arabia in the 1950s, the explorer Wilfred Thesiger was told by His Highness (H.H.) Sheikh Zayed, now the President of the United Arab Emirates (UAE), that a good falcon might take eight or nine houbara in a day.<sup>12</sup> The houbara, which was boiled or roasted and served with rice, represented a valuable supplement to an otherwise severely limited diet of rice, dates, and milk. At the end of the winter, the falcons would be released back into the wild. Unlike European falconers, for whom the aesthetics of the falcon's flight was and still is the main

purpose for falconry, the desert Arabs also flew their falcons for a more pragmatic reason—food.<sup>8</sup> Thesiger accompanied H.H. Sheikh Zayed on hunting trips in 1949 and 1950, and his firsthand experience of traditional desert falconry left a great impression on him<sup>12</sup>:

... for months we rode for long hours on superb camels, slept on the ground in the open, fed on the hares and bustards we had taken, half a dozen in a day if we were lucky—an exacting and rewarding experience in confronting an immemorial past.

What is the allure of the houbara that even today, when modern convenience stores have replaced the need to hunt houbara. Arab falconers have retained their fascination for the bird? Part of the reason is that it is large and tasty, but the addiction runs deeper than this. For generations, Arab poets have written about "*her*," old men have sung of "*her*," and even today, behind the closed doors of their embassies, Arab diplomats are rumored to discuss the advent of the next houbara season incessantly. The houbara has held a fascination for the tribesmen, and its cunning and courage in defending itself are the subjects of endless stories. The houbara is a clever, wary bird and needs to be found by following its tracks. It is a contest of wits to find the bird, with the falconer pitted against the houbara. Then there is the contest between the falcon and the houbara, in which the flight can go on for many miles. Not surprisingly, a rich folklore has evolved around the sport, the falcon, and the bustard. Men compete with each other to catch the greatest number of hou-



**Figure 4.** A houbara bustard fitted with a satellite transmitter before release for migration studies.

bara bustards with their falcons, and the gizzard of the bustard has even been claimed to have aphrodisiac properties.<sup>13</sup> Reading the poetry written by Arab falconers, we can understand the respect felt for their cunning prey. Later, around the campfire, each hunt is relived, and in the words of H.H. Sheikh Zayed,<sup>7</sup> “upon their return in their fast-running cars, falconers bring bustard and tell stories about them.”

Falconry and hunting the houbara bustard, therefore, are still part of the way of life for many Gulf Arabs (Fig. 3). In the UAE, many locals practice falconry, and most still have members of their families who fly falcons.<sup>14</sup> Beginning in October, when falcons start to be trained again, it is common to meet Emiratees in banks, shops, and on the street with falcons on their fists. Falcon images adorn stamps, postcards, guidebooks, and the sides of the national airline, and falcon statues fill roundabouts and tell the time in city centers. The falcon is the universal image, a reminder of the powerful hand of the desert culture that has only recently been exchanged for the luxuries of urban existence. Hunting parties represent an important social gathering, where the sheikhs and their entourage unite as a hunting party, with the shared goal of catching houbara, and socialize around the campfire at night. H.H. Sheikh Zayed wrote eloquently on the importance of falconry in modern Arab life<sup>7</sup>:

Our hunting trips accustom us to patience and endurance and are a source of satisfaction to us. We regard them as a means of achieving a degree of psychological equilibrium between sedentary urban

life and that of the desert. The simple happiness this sport brings us fortifies us against the stresses and strains of our official duties.

#### The Changing Face of Arab Falconry

The countries of the Arabian peninsula are hardly renowned for their good conservation. The list of species that have disappeared or declined largely because of hunting is depressing reading, and prominent on that list is the houbara bustard. Having wiped out the houbara in their own countries, the Gulf hunters have been going elsewhere to satisfy their sporting needs.<sup>15</sup>

With the advent of oil wealth in the late 1960s, Arab falconry changed. The camel was replaced by four-wheel drive vehicles, trackers were employed to locate the birds in the desert, and falconers operated in small search parties communicating by radio and mobile telephones. One of the characteristics of the houbara that makes it particularly vulnerable to falconers equipped with vehicles is that, when closely approached, the bird will retreat into the shelter of a bush or freeze by squatting on the ground. Goriup considers that between 1950 and the mid-1960s, the resident population of houbara in Arabia was significantly reduced as a direct result of overhunting.<sup>13</sup>

Once houbara became scarce in their own countries, falconers began to venture abroad to Pakistan, Morocco, Algeria, Sudan, Niger, Somalia, Ethiopia, Libya, Egypt, and Chad, hunting other species of bustard capable of being caught with falcons.<sup>13</sup> Although the houbara bustard is protected “on paper”

in Pakistan and Egypt, hunting parties have been permitted by the governments of these countries.<sup>15,16</sup> In Pakistan, for example, the houbara has been a protected species since the late 1970s and cannot be hunted, shot, or trapped by Pakistanis.<sup>17</sup> However, in 1992 the Pakistan government exempted many Gulf rulers and ministers from this law.<sup>15,16</sup> Hunting parties were sanctioned by government ministers to hunt in Egyptian wildlife reserves.<sup>15</sup> Poverty is an important reason why these countries flout international agreements and bend their own national laws.<sup>18</sup> In Pakistan, for example, the gross national product per capita is around \$420 US per year,<sup>19</sup> and the country's development is closely tied to investment and development aid from the Middle East, as well as from remittances by two million expatriate workers.

Traditional falconry has been replaced with technofalconry, and the balance has tipped in the hunter's favor. Falconry in itself is not dangerous, but the attitudes with which it is pursued are doing much harm. Many of the modern participants of this sport are not behaving responsibly. The wisdom of leaving enough birds for another season, the essence of sustainable use, is being ignored. This behavior has also resulted in a wave of critical reports in the international press about the damaging behavior of these hunting parties.<sup>15,18</sup>

A great deal of concern has been expressed over the last 25 years over the uncontrolled hunting of the houbara bustard.<sup>13,15,17,20-22</sup> It could be argued that Arab falconry has received bad international publicity because it is perceived by many western conservationists to be the blood sport of an elite band of privileged, rich people who exploit the natural resources of poor countries. Field sports such as fox hunting are under similar pressures in Europe, particularly those sports in which the participants are perceived to be wealthy. These ingredients of Arab falconry, combined with the "exotica" of the private lives of the participants, may well make newspaper headlines and controversial magazine articles<sup>15,18</sup> but may exaggerate one of the many factors involved in the decline of the houbara. Arabian falconry should not be judged unfairly by the actions of its less responsible participants, which unfortunately exist within any sporting fraternity. The rich tradition of desert falconry has coexisted for hundreds of years in harmony with its main prey species, the houbara bustard.

A change in attitudes is taking place, and there is a desire among influential Arab leaders to support houbara bustard conservation programs. Most initiatives to establish captive breeding and reintroduction programs are supported by responsible Arab

falconers who are concerned about the long-term futures of both their tradition of falconry and the houbara. The National Commission for Wildlife Conservation and Development (NCWCD) in Saudi Arabia was one of the first of such organizations, established by Prince Saud Al Faisal,<sup>24</sup> and the National Avian Research Center (NARC) in the UAE was established in 1989. In the 1993 annual report of the NARC, one of the royal patrons, H.H. Sheikh Khalifa bin Zayed Al Nahyan, summed up this change in attitude<sup>24</sup>:

... the roots of Arab falconry go back a very long way, to people who were living close to nature, in harsh desert conditions. Just as modern technology has improved our efficiency and success as falconers, so technology can be used to ensure that our hunting and use of the desert does not impose unnecessary burdens on desert wildlife.

Just as the skills of falconers and falconry have been used in Europe and North America by falcon scientists to study wild raptors, establish captive breeding and restoration programs, and rehabilitate injured falcons,<sup>25</sup> so falconry in Arabia has the potential to be a valuable tool for conservationists working with both falcons and houbara. The live capture of free-living houbara by a specially trained saker falcon has enabled field ecologists to fit bustards with satellite transmitters and follow their migration routes from Arabia to central Asia.<sup>26</sup> This represents the first recorded occasion when desert falconry has been directly used to assist the scientific study and conservation of its prey.

#### **Status of the Houbara Bustard and Factors Affecting Its Decline**

Few reliable data exist on the exact status of houbara populations, but their numbers are generally considered to have declined over most of their range during the last few decades. Reasons for the decline include excessive hunting, overgrazing of habitat, agricultural development, and industrial development.<sup>21</sup> In a recent review of the world status of the houbara bustard, Goriup considered that *C. u. macqueenii* populations should be considered as "near threatened."<sup>27</sup>

The houbara was able to survive a long tradition of falconry in Arabia, but the widespread availability of four-wheel drive vehicles, which has made even remote populations vulnerable to hunting, is considered to have contributed significantly to the alarming decline of this species over the past 20 years.<sup>4</sup> Even Philby considered that the bird was being overhunted by firearms from vehicles. As a result, houbara were becoming more timid in the

presence of humans and were being "thrust back into the more inaccessible parts of the desert."<sup>28</sup> Reports by European travelers to Arabia early in the 20th century indicated that the houbara was relatively common.<sup>12,29,30</sup> In the Middle East, the increased ease of water transportation has meant that previously remote areas of desert have been made accessible to nomads and their livestock, and widespread overgrazing of the fragile desert flora by sheep and goats has caused a massive loss of houbara habitat.<sup>4,31</sup> In the UAE, declines in the houbara population were attributed not only to hunting pressures but also to the effects of locust control programs.<sup>21</sup> The houbara's preference for relatively flat, vegetated plains brings it into contact with human use of the desert because these areas are preferred for agricultural development, road building, oil and water pipelines, and general access to four-wheel drive vehicles.<sup>32,33</sup>

In the wintering grounds of the houbara bustard, such as in the Baluchistan region of Pakistan, falconry is thought to have had a severe impact on the bird's population. In the winter, a large part of the central Asian breeding population of houbara bustards is packed into an area an eighth the size of its breeding grounds, yielding a high density of birds.<sup>34,35</sup> However, an increasing number of local people are thought to be shooting houbara because of the increased availability of guns and the need to supplement their diet with meat.<sup>36</sup> Habitat degradation caused by an increasing human population, poaching, agricultural extension, heavy grazing, floods, and canal construction are also considered to threaten the houbara population in Pakistan,<sup>37</sup> which is considered to have declined by 20% since 1971.<sup>38</sup> Estimates for the number of houbara killed by falconry parties in Pakistan vary between 3,000 and 10,000.<sup>16,18,35,39,40</sup> Most researchers believe the figures could be much higher, but because strict secrecy is maintained by the hunting parties, accurate estimation of the catch is difficult.

Studies in the former states of the Soviet Union also indicate an overall reduction of the total population.<sup>41,42</sup> Large-scale development of land for cotton production (associated with high levels of pesticide use), industrial activity, the establishment of settlements, increased disturbance, and illegal shooting and poaching in central Asia, combined with the political situation in the newly independent states and the increase in the human population, are all likely to have a significant effect directly on the houbara bustards. These factors also affect the quality and quantity of habitat available to it.<sup>43,44</sup> Large scale hunting (other than falconry) of the houbara also occurs along its migration routes and in its win-

tering grounds. In Iran, hunters are estimated to shoot 15–20% of the population of Iranian houbara bustards each year.<sup>45</sup> The Iran–Iraq war may also have disrupted important wintering grounds of the houbara in Iran<sup>45</sup> and breeding grounds in southern Iraq. The status of the bird in Afghanistan may also have been harmed by the civil war.<sup>2</sup>

The international trade in live houbara bustards may represent an additional drain on the populations of free-living birds, although little data exist on the scale of the trade. In the late 1980s, Ramadan-Jaradi and Ramadan-Jaradi considered that, in the markets of the UAE alone, up to 2,000 wild-caught houbara bustards were being sold annually.<sup>46</sup> This trade in live houbara bustards is fueled partially by falconers who train their birds by using "bagged" quarry and partially by wealthy dignitaries who maintain large collections of bustards in private zoological collections. Not only are the transport conditions inadequate, but bustards are often mixed with domestic poultry and pigeons and are, therefore, exposed to, and die of, diseases they have probably never encountered in the wild. It is hardly surprising that large numbers of birds die. The following passage describes the way the birds are transported into the Middle East<sup>47</sup>:

Houbara bustards are transported from Pakistan to the Middle East by *dhow* and plane in crates containing chickens which are often in close proximity to crates of pigeons. Conditions during transport are unhygienic; houbara bustards are transported in three-tiered crates with welded mesh floors where the birds in the upper levels defecate on the birds in the lower levels, the birds are often unable to stand upright in the cramped and crowded crates, food and water provision is inadequate and frequently absent so birds arriving are always in poor body condition. These factors are likely to be extremely stressful for wild birds that have recently been captured.

### Conservation of the Houbara Bustard in the Middle East

The pressures of modern development on the wildlife heritage of Arabia are now so great that many species will simply not survive without active protection, but it is not only a matter of isolated species. Whole regions are in danger of losing the botanical diversity upon which both man and wildlife depend. Unlike other lands within the great desert system of Africa and Asia, the countries of Arabia have small populations and the resources to implement fully the protection of this heritage.<sup>48</sup>

Strategies for the conservation of the houbara have been proposed by Fergeson,<sup>49</sup> Taylor,<sup>16</sup> Porter and Goriup,<sup>22</sup> Flint et al.,<sup>50</sup> and Launay.<sup>51</sup> These strat-

egies have included a combination of the following concepts: creation of national conservation organizations, captive breeding and reintroduction projects, conservation of free-living houbara by creating networks of protected areas and improving habitats, increasing the productivity of natural reproduction, increasing public awareness, and legislative protection. The creation of a falconers' association in Arabia<sup>52</sup> and the initiation of biomedical studies have also been suggested.<sup>53</sup> Conservation programs to maintain and improve the status of houbara bustards to provide a continuous source of birds for traditional falconry will inevitably be linked with the sustainable management of arid lands. This will help focus public attention on wider conservation issues and ensure the success of other lower profile species. Houbara bustards may be a good indicator species to monitor the health of the environment in arid and semiarid zones.<sup>54</sup>

### **The creation of national wildlife conservation agencies**

Middle Eastern governments have acknowledged the need to responsibly manage their natural resources and have established a number of conservation organizations, including the NCWCD in the Kingdom of Saudi Arabia, the NARC in the UAE, the Office of the Advisor for Conservation of the Environment in the Sultanate of Oman, the Al Areen Wildlife Park and Reserve and the Nature Protection Committee in the State of Bahrain, the Environmental Protection Committee in Qatar, and the Royal Society for the Conservation of Nature in the Kingdom of Jordan. All these agencies are involved in the protection of indigenous wildlife, including houbara. The wildlife agencies in the UAE and Saudi Arabia are devoting considerable resources to develop strategies to conserve houbara within their own countries and to work with conservationists in other range states.

### **Captive breeding and restoration programs**

Although large-scale projects have been established in Arabia, the earliest reports of houbara bustards maintained in a captive zoological collection date back to the early 20th century. These early records were of wild-caught houbara maintained or examined postmortem at the Zoological Society of London.<sup>55</sup> However, it is only relatively recently that houbara bustards have been bred in low numbers in captive breeding projects in Uzbekistan,<sup>56</sup> at the Dubai Wildlife and Research Center,<sup>57</sup> at Al Ain Zoo,<sup>46</sup> and at Tel Aviv University.<sup>32</sup> Many of these projects have found that, although specimens caught

as adults will eventually adapt to captivity, they remain shy, are easily stressed, and will not breed.<sup>58</sup> Ideally, stock for captive breeding are young chicks or eggs that are collected from the wild and incubated and are hand reared.<sup>4</sup> Both the NARC and the NCWCD projects use breeding stock from free-ranging populations; the Saudi Arabian project collected stock from Baluchistan and Algeria in 1986<sup>4</sup> and the NARC project collected eggs and chicks from Kazakhstan in 1995. Because houbara are known to lay a replacement clutch, eggs were collected (with local permits and Convention on Trade in Endangered Species [CITES] permits) from breeding populations at the beginning of the reproductive season to minimize possible detrimental impact on the free-living population.<sup>23</sup>

The foundation of a captive flock of hand-reared houbara is necessary to have birds tame enough for handling, artificial insemination, and egg-manipulation procedures. Captive propagation of houbara has proved to be problematic, but, with hand-reared stock, the NCWCD produced 238 chicks from 75 laying females in 1993, and they estimate that they will produce a surplus of 1,000 houbara bustard chicks annually by the year 2000.<sup>23</sup> The NARC is currently working toward a long-term position of being able to produce 500 houbara per season by captive breeding.<sup>59</sup> An ecophysiology program has been initiated at the NARC to understand the behavior and endocrinology of the houbara reproductive cycle.<sup>60</sup> Knowledge gained from these studies will contribute to the development of techniques to manipulate the reproduction of captive houbara.

The aim of these captive breeding programs is to breed and release surplus birds to supplement a declining free-living population. In 1991, the first release of captive-bred houbara in Saudi Arabia<sup>23</sup> took place, and in 1995, the first breeding by these introduced birds was reported.<sup>61</sup> The major problem encountered by the initial releases of houbara was the high level of predation released houbara by mammalian predators.<sup>4</sup> For reintroductions to be successful, research to assess release techniques will be vital. Research is underway at the NCWCD<sup>23</sup> and the NARC to investigate different methods of chick rearing, including predator recognition training, so that captive-bred birds will be adapted for life in the wild.

### **Habitat protection and ecological studies**

Most biologists consider that habitat preservation has the highest priority for wildlife conservation and that captive breeding programs remain only as a supportive method to this.<sup>48,62</sup> In Saudi Arabia,



**Figure 5.** Release of a houbara bustard from a rehabilitation center in Pakistan.

protected areas have been established around the last known houbara bustard breeding areas.<sup>23,63</sup> Hunting was forbidden and grazing livestock was restricted to camels only. In one case, the entire 2,300 km<sup>2</sup> was fenced to assure complete protection against hunting and grazing.<sup>63</sup> Habitat restoration of desert is being attempted by the NARC to encourage greater numbers of bustards to overwinter and to ensure that suitable habitat is available for released captive-bred birds.<sup>64</sup>

Detailed knowledge of the normal behavior of free-ranging houbara is required. The NARC has initiated a distribution and migration program, tracking free-living houbara fitted with satellite transmitters (Fig. 4).<sup>5,26</sup> The results of this work will help to pinpoint the breeding grounds in central Asia and to assess the factors that threaten houbara that are migrating between their breeding grounds and the UAE. This knowledge will help to determine where resources should be targeted by Gulf Arab states to help central Asian countries protect the habitats where houbara breed. Ecological surveys and Geographical Information Systems are being used to map distributions of suitable habitats and to identify potential reserves in the UAE.<sup>33,65</sup> Fieldwork is being carried out in central Asia to increase understanding of the status and biology of free-living houbara populations.<sup>66</sup> Information derived from these studies will be used to develop management plans for free-ranging bustards and their habitats so there will be a rational basis for controlling hunting through bag limits, restricted hunting areas, and seasons.

### **Biomedical research programs**

The larger conservation organizations that have been created in the Middle East have established veterinary science departments. The implementation of a comprehensive species-specific biomedical research program to improve the standard of veterinary care of bustard species in captivity and to investigate the diseases of free-living bustards has been discussed previously.<sup>53</sup>

### **International houbara trade and rehabilitation programs**

The admission of the UAE as a member of the CITES and the banning of trade in bustard species by the UAE government in 1994 are other important factors that may reduce houbara mortality resulting from unregulated trade and transportation. A recent initiative by the Houbara Foundation International, Pakistan, has been to confiscate illegally trapped houbara from poachers and bird dealers before they are transported to the Middle East.<sup>67</sup> This organization aims to provide a suitable environment at rehabilitation centers where the birds receive medical and nutritional attention before they are released back into suitable habitats (Fig. 5).

Western pressures to stop houbara hawking, will if successful do little to help the situation. It would be a negative approach to the problem. The Arab falconer, eager to ensure the future of his sport is the interested party whose help must be sought to suggest further controls and to finance sensible research into the houbara and its ways. In the West, falconer



and conservationist work together with common interests. Let us hope that international conservationists will be sensible enough to invite the Middle East falconers to help participate in houbara conservation.<sup>10</sup>

### Arab falconry associations

A positive approach is needed to conserve the houbara bustard and the traditions of desert falconry. The two subjects are so closely tied that the conservation of one conserves the other. Without bustards to hunt, traditional Arab falconry is finished, and perhaps without Arab falconry, the houbara is finished, for no other group of people in the world have such a passion for the houbara as those that hunt them.<sup>68</sup> More effort and more resources have been spent on the houbara than any other bustard, not because it is the rarest, but because it is hunted.<sup>69</sup> In this respect, the NARC and the NCWCD were founded because of concerns felt by influential Arab falconers about the future of the houbara. The creation of an Arab Falconry Association has been suggested as a way of ensuring that the people who want to continue hunting the houbara and who wish to keep their tradition of falconry alive become responsible for their sport.<sup>52</sup> Only when local people acknowledge that their actions are detrimental to the future of the houbara in the wild will they come up with home-grown solutions to the problems. Such an association could set hunting seasons and bag limits, establish ethical codes of conduct, protect nonhunting zones, and require registration of legal hunters.<sup>14</sup> The maintenance of records by such organizations could also provide valuable data to assess the impact of hunting.

One important falconry initiative that was established in 1994 is the Middle East Falcon Research Group, which, through the veterinary department of the NARC, coordinates activities related to falcons and falconry. This group held a specialist workshop in Abu Dhabi in 1995 and brought together biologists, veterinarians, public awareness specialists, and falconers in a forum to promote the better management of captive and free-living falcons in the Middle East. This organization sponsors biomedical research and the production of public awareness material and produces a quarterly newsletter called *Falco*.<sup>70</sup>

### Sustainable use of houbara outside the Middle East

The houbara could withstand a certain amount of hunting as long as adequate controls are enforced. In some areas, houbara have the potential to be a

valuable resource if used carefully and according to principles established by proper scientific study. Outside the Middle East, countries such as Pakistan and the central Asian states have the possibility to earn much needed revenue if they allow a sustainable and controlled approach to hunting. Presently, these countries are likely to kill off the proverbial bustard that lays the golden egg through overexploitation. The collection of breeding stock by organizations such as the NARC and the NCWCD could be seen as the first attempts at a regulated and sustainable use of free-living houbara populations. Providing eggs or chicks obtained through a sustainable harvest to supply new genetic material to existing breeding programs and stock to new breeding projects has the potential to earn revenue for these countries. Most importantly, the houbara will become a valuable resource that must be managed responsibly. Experience in many African countries has shown that significant revenue can be earned through sustainable use of wildlife resources such as game viewing and game hunting.<sup>71</sup>

### Public awareness programs

Conservation programs have realized the value of public awareness programs to inform and to change people's attitudes at national and international levels about key wildlife issues. The NARC and the NCWCD have initiated public awareness campaigns to foster support for houbara conservation.<sup>14</sup> Information has been disseminated through press releases, film, videos, and publicity campaigns to make local people aware of the status of houbara bustards. If these people can develop an appreciation for the need of bustard conservation, they may then help develop strategies needed for species recovery. Conservationists in Saudi Arabia consider the use of the houbara as a flagship species around which to rally public support crucial to the success of conservation programs in this country.<sup>72</sup> The strong influence of Islam in Arabia is likely to prove beneficial in promoting the attitudes of nature conservation. Islamic teaching emphasizes that humans should live in harmony with nature and the environment and that humans are in fact the custodians of the natural world.<sup>73</sup> International public relations are an important component of Middle East conservation programs. The gung-ho attitudes of Arab falconers have received particularly bad press in the international media. As a result, international opinion on the attitudes toward wildlife by Middle East countries is rarely positive. Arabian countries that have started to manage their natural resources should publicize their efforts to counter the negative

international attitude and to promote national pride in the attempts being made to conserve indigenous species such as the houbara.

### National and international cooperation and agreements

International cooperation is crucial to ensuring the conservation of this migratory species across its range. Houbara are locally protected in many countries in the Middle East, including Saudi Arabia, Jordan, Israel, and Iran. International agreements, cooperation, and legislation will also increasingly play a role in conserving the houbara bustard. However, the main problem associated with legislation to protect the houbara bustard is the lack of enforcement. Hunting bans are flouted by hunters, and bustards are trapped in the wild and imported into the Middle East contrary to international laws.<sup>13,15</sup> Despite these problems, progress is being made. In 1996, a draft agreement on the conservation and management of the houbara bustard was released by the NCWCD, and the NARC has been appointed to coordinate Houbara Specialist Group of the International Union for the Conservation of Nature and Species Survival Commission.<sup>51</sup>

### Conclusions

It is sobering to consider the fortunes of the Arabian ostrich (*Struthio camelus syriacus*), a species that became extinct because of an unfortunate combination of factors. The Arabian ostrich, like the houbara bustard, played a central role in Bedouin life for centuries. As recently as a century ago, this species was found throughout the peninsula. Ostriches were greatly valued by the Bedouin for their meat, oil, feathers and eggs. However, after the First World War, Arabia was flooded with modern rifles, vehicles were used for hunting, and demand for ostrich plumes increased; as a result, the ostrich became extinct.<sup>48</sup> Although the houbara is seriously threatened, the prospects for its conservation appear to be positive. The decline of the houbara has been recognized as a cultural loss in many countries in the Middle East. Large, well-resourced captive breeding and reintroduction programs have been initiated in Arabia, and conservation work is being carried out throughout the bird's range. These projects have the potential to catalyze the initiation of projects on other threatened Arabian species and, because they are comparatively well funded, could become centers of excellence in the field of conservation biology. Let us hope that the words of H. H. Sheikh Zayed remain true for the houbara in the

future as they have in the past: "Let the bustard which fly as fast as the wind fly away and return."

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