



Birds and mammals in Dasht-e Nawar, Afghanistan: occurrence and hunting pressure, 2007 surveys



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Cover photo: The extensive high-altitude plain of Dasht-e Nawar. In the background, Ab-e Nawar Lake. April 2007.

All photographs: WCS Ecosystem Health Project Team

Map: Mr. Rohullah Sanger, GIS analyst, WCS

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EXECUTIVE SUMMARY

We carried out two surveys in 2007, one in spring (22 April–1 May) and one in summer (27 July–10 August), to document the occurrence of bird and mammal species in Dasht-e Nawar and to assess the hunting pressure on them. Located in Ghazni Province, in eastern Afghanistan, Dasht-e Nawar is a high-altitude wetland surrounded by peaks. It was declared a National Waterfowl and Flamingo Sanctuary in 1974 but its protection has apparently never been implemented. We collected data through direct observations and questionnaire investigations in a randomly selected subset of local inhabitants (49 households). Questions concerned the presence in the area of selected key mammal and bird species, and hunting practices.

We sighted 92 bird species —with an additional 2 of questionable identification— adding 40 species to the bird list of Dasht-e Nawar compiled by Habibi (2007). The updated list now amounts to 142 bird species for the area. During the summer mission we observed the breeding of the greater flamingo (*Phoenicopterus roseus*) more than 30 years after the last report. Overall, our observations confirmed that Dasht-e Nawar is a very important bird area for Afghanistan which should be preserved.

For mammals, we observed specimens of Afghan pika (*Ochotona rufescens*), red fox (*Vulpes vulpes*), and Pallas' cat (*Otocolobus manul*). We found fresh tracks of wolf (*Canis lupus*) and old feces of crested porcupine (*Hystrix indica*), and we captured a vole (*Microtus afghanus*?). The majority of interviewees reckoned that Alpine ibex (*Capra [ibex] sibirica*), Cape hare (*Lepus capensis*), golden jackal (*Canis aureus*), striped hyena (*Hyena hyena*), stone marten (*Martes foina*), red fox, wolf, and long-tailed marmot (*Marmota caudata*) occur in the area.

Questionnaire investigations and direct observations showed that inhabitants of the area extensively capture water birds in summer, when they cannot fly because they molt their wing feathers. Flamingoes do not seem to be targeted but mass-capture of other water bird species could have an impact at population level. We had no indications that the Afghan snowfinch (*Pyrgilauda theresae*), a relatively common species in the mountain slopes of Dasht-e Nawar, and the only true endemic bird in Afghanistan, suffers any immediate threat.

BACKGROUND INFORMATION ON DASHT-E NAWAR

Situation

Dasht-e Nawar (33°50'N, 67°50'E) is located in the province of Ghazni, in eastern Afghanistan. It is an extensive high-altitude (3150 m asl) plain in the Koh-e Baba range, an offshoot of the Hindu Kush mountain range. The area encompasses 600 km² of grass-meadow plain, mudflat and brackish ponds and lakes, the largest one, Ab-e Nawar, extending over approximately 35 km² (Figure 1).

Protection status

Afghanistan possesses few wetlands other than its major river systems rising in the high mountain ranges in the center and northeast of the country. Dasht-e Nawar and Ab-e Estada, also located in Ghazni Province 50 km south of Dasht-e Nawar, are the only two sizeable wetlands between the Amu Darya and the Helmand river basins. They have long been renowned as breeding areas for the greater flamingo (*Phoenicopterus roseus*). The Government of Afghanistan declared Dasht-e Nawar a National Waterfowl and Flamingo Sanctuary in 1974 and recommendations for the protection of the site were developed by UNDP/FAO in 1977 (Shank and Rodenburg, 1977). The site also meets the criteria for listing as an internationally important site for migratory and breeding waterbirds under the Ramsar Convention. However, the protection allocated to the area in the 1970s has apparently never been really implemented and could even be no longer legally valid. In 2006 a joint mission of the United Nations Environment Programme (UNEP) Afghanistan Field Office and the National Environmental Protection Agency (NEPA) tried to revive the project to nominate Dasht-e Nawar as an important bird area under the Ramsar Convention (Petocz, 2006).

Hydrology

Hydrology of the area has not been extensively studied. Water supplies seem to come primarily from spring snow melt in the surrounding mountains and several springs on the western part of the lake. Water level in spring is therefore nearly entirely dependent on winter precipitation. Nogge (1974) believed that Ab-e Nawar water volume might drop from 20 million m³ to 2 million m³ between spring and fall. In 1999, the main lake dried up completely due to a severe drought. The UNEP post-conflict environmental assessment team which visited the area in September 2002 reported that the main lake was dry, and had disappeared in summer for the past four years. In September 2002 small ponds, created by natural spring waters and streams, persisted on the west side of the lake and welcomed most waterfowls present in the area. In June 2006 a mission led by Dr Petocz reported that by the end of June the lake was dry (Petocz, 2006).

Any attempt to develop sustainable conservation programs of the unique ecosystem of Dasht-e Nawar will require a better understanding of the complex hydrology of this area.

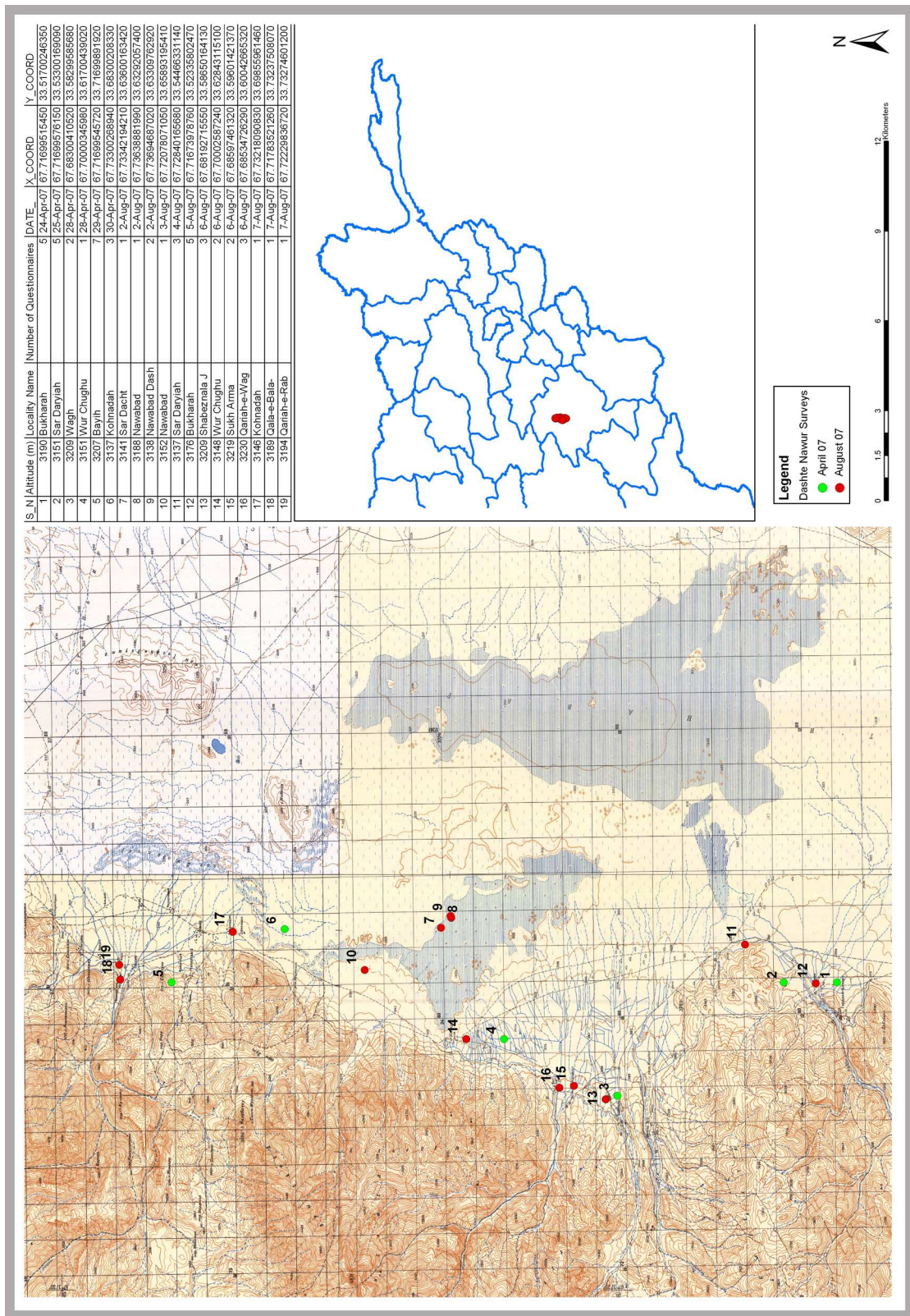


Figure 1. The study area in Dasht-e Nawar, Ghazni Province, Afghanistan. The general location of the area in Afghanistan is shown on the right side. Dots (plain circles) on the close-up map show the localizations of questionnaire investigations.

Human settlements

According to the UNEP mission carried out in 2002, approximately 24,000 resident people lived in villages distributed on the west side of the wetland (UNEP, 2003), a 20-time increase compared to the 1977 population estimates (Shank and Rodenburg, 1977). The population is largely agro-pastoralist, producing wheat for subsistence and sheep, goats and cattle for milk. It is not known whether significant numbers of poultry are present in the area. However, at least small scale subsistence poultry production should occur in the area as it is the case in most villages in Afghanistan.

Hunting

C. Shank and W. F. Rodenburg (1977) listed in an earlier report indiscriminate hunting and egg collection as a danger to the continuing viability of the wetland avifauna. More recently Petocz (2006) mentioned that hunting remains a problem although its overall impact on the bird populations is unclear. Harvesting a resource at hand, such as water birds, seems to be a common practice in this area where agriculture and livestock herding revenues can be dramatically impacted by harsh winter conditions, undermining the nutrition of local settled people. To which extent this practice impacts animal populations is currently unknown. The disturbance is presumably higher during periods of low-water levels when breeding grounds on islands can be reached on foot. We suspect that the highest level of disturbance occurs in July–August when islands are easier to access and adult waterfowls more or less flightless because of wing feather post-breeding molt. Another form of wildlife harvesting is the capture of live raptors for local or international falconry, which was documented in Ab-e Estada (Shank and Rodenburg, 1977). There is also a concern that the fauna of Dasht-e Nawar could be hunted by sport hunters from urban areas as was the case in Ab-e Estada in the past (Petocz, 2006).

Wildlife

Habibi (2007) compiled bird records made by bird watchers, ornithologists, and scientists who worked in Afghanistan in the 1970s when the country was undergoing a period of peace. We have extracted from this compilation records made in Dasht-e Nawar which amount to 102 species. Some were publicized in publications (Klockenhoff and Madel, 1970) or unpublished reports (Petocz and Habibi, 1975; Shank and Rodenburg, 1977), but Habibi also compiled unpublished field notes from T. Eliots, P. Ramsey, J. Scarborough, W. Foster, Y. Young, J. Niethammer, A. Kullberg, E. Arghendewal, G. W. Foster, J. Sayer, A. Wassey, A. Rahim, and N. Komak.

Little is known about mammal species occurring in Dasht-e Nawar area. Petocz (2006) mentions the presence of long-tailed marmot (*Marmota caudata*), ground squirrel (*Spermophilus fulvus*), jackal (*Canis aureus*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), and Afghan pika (*Ochotona rufescens*). Local people reported to him sighting urials (*Ovis orientalis cycloceros*) in the surrounding mountains but their numbers are

apparently very low. Petocz himself noticed horns of Alpine ibex (*Capra [ibex] sibirica*) decorating a shrine in Dasht-e Nawar, but their origin was not determined.

OBJECTIVES AND METHODS OF THE SURVEYS

Objectives

Dasht-e Nawar has long been considered an important bird area for Afghanistan, especially for waterfowl. The surveys carried out in Dasht-e Nawar area in 2007 were dedicated at collecting data on the occurrence of wild birds and mammals in the area, as well as assessing local hunting pressure. The surveys also aimed at identifying risk factors of possible cross contamination of the H5 subtype avian influenza virus between wild and domestic birds, but results concerning this aspect of the survey will be provided in a separate report.

Methods

Dates of surveys

Spring survey took place between 22 April and 1 May 2007, after winter snow melt and during breeding time for birds (Plate 1). Summer survey took place between 27 July and 10 August 2007, in post-fledging time for most bird species (Plate 2).

Survey area and transport

For both surveys, we focused on the western part of the area where all human settlements are located (Figure 1). We identified three major biomes¹: 1/ east-facing mountain slopes and adjacent foothills; 2/ villages and surrounding cultivated areas; 3/ grass-meadow, mudflat, brackish lakes and reed beds in summer (Plate 3). The survey team drove by taxi to Ghazni, capital of Ghazni Province, rented a four-wheel-drive-car and drove to Dasht-e Nawar on the following day. The village of Bukharah in Dasht-e Nawar was used as a base location in the area. We used four-wheel-drive cars to move between the villages and visited households in villages and different biomes by foot. Summary of activities per day can be found in Appendix 1.

Data collection and analysis

To a few exceptions we only provide firsthand observations collected in the field and results of questionnaire investigations carried out in a randomly selected subset of local inhabitants. The report tries to be a snapshot of the occurrence of wild mammals and birds in the area at the time of the surveys.

Interviews

We collected data on hunting practices and occurrence in the area of selected wild bird and mammal species by interviewing an elder in randomly selected households.

¹ We define a biome as a climatic and geographically defined area of ecologically similar communities of plants, animals, and soil organisms, often referred to as ecosystems.



From top to bottom: Plate 1. Dr. Ali Madad Rajab, a research assistant of the WCS Afghanistan Biodiversity Project, standing in Dasht-e Nawar plain shortly before the peak of spring snow melt in April 2007. Three months later this area was partially flooded. Plate 2. Dr. Ali Madad Rajabi takes a GPS location of a mudflat in Dasht-e Nawar, August 2007. Plate 3. A general view of Dasht-e Nawar in spring 2007 showing the three main biomes encountered in the area. On the foreground, east-facing mountain slopes and adjacent foothills (biome 1), then a village with cultivated areas (biome 2) and in the background, grass-meadow, mudflat, and brackish lakes (biome 3).

Questions also concerned poultry health as the surveys also aimed at documenting the risk of avian influenza contamination in the area. We interviewed 23 and 26 different people from a total of 49 different households in April and July respectively. Two team members conducted the interviews in Dari (Persian language in Afghanistan) and one of them translated them into English afterwards. Each interview lasted roughly 30 minutes and consisted in 24 predetermined questions about the background of the respondent (name, locality, GPS location, and average distance from Ab-e Nawar), hunting practices (Do you hunt? When? For how long? How many kills per year? Which species? Hunting trend in the area? Reason for such trend? Where do hunters come from?), greater flamingoes in the area (Are they present each year? Population trend?), occurrence of wild birds (What are the seven most prominent bird species according to your personal experience?) and mammals in the area (According to a presented gallery of pictures does the following species occur in the area: wolf, jackal, red fox, ibex, wild sheep, leopard, snow leopard, small cats, caracal/lynx, brown bear, stone marten, hyena, marmot, hare, porcupine, others? If positive, where and when?), poultry owned (Species? Numbers? Contact with wild birds? Any sickness/disease for the past 2 years? Any treatment? Any human sickness related to poultries?). The same questions were presented in the same manner and order to each subject. The present report only takes into account the questions dealing with hunting practices and the occurrence of mammals and birds in the area. We tallied answers and calculated the percentages of various responses.

Direct observations

Every day we visited the three different biomes for 2 to 3 hours. Biome 1 and 2 were visited between 5:30 and 11:00 and biome 3 between 16:00 and 19:30. We recorded all wildlife sightings (species, numbers, and for mammals: foot prints, feces, burrows). Apart for the flamingoes we did not attempt to quantify population abundance.

RESULTS AND DISCUSSION

Hunting

Ten out of the 49 interviewed persons (20%) admitted hunting regularly: five hunted all year round; two hunted only during autumn and winter, specifically targeting ibex; two only hunted birds during summer; and one hunted all year round except in summer where he was too busy with agricultural works. Although most interviewed people did not admit hunting, we believe this activity is widely practiced in the area. Indeed, all proclaimed hunters mentioned that most of the people living in the area catch molting water birds in summer and that ibex numbers have markedly declined because of over-hunting. Hunting in Dasht-e Nawar seems to be practiced according to a seasonal pattern. In winter, hunters essentially shoot ibex and trap and/or shoot wolves, jackals and red foxes. They all admitted that it is becoming increasingly difficult to kill ibex because they are very few and very shy of human beings.



From top; clockwise: Plate 4. An adult European sparrowhawk (*Accipiter nisus*) recently captured in Dasht-e Nawar, April 2007. Plate 5. Two red foxes (*Vulpes vulpes*) found dead near Nawabad village in Dasht-e Nawar, April 2007. They were killed by local people as retaliation to poultry losses. Plate 6. In summer molting waterfowls such as this common teal (*Anas crecca*) are captured by local people for food, August 2007. Plate 7. This great crested grebe (*Podiceps cristatus*) was captured as a flightless juvenile in Dasht-e Nawar. Now imprinted to humans it is kept in the backyard pool of a household with domestic fowls, August 2007. Plate 8. A flock of hand-captured coots (*Fulica atra*) brought back to the village by local hunters. We suspect that coots suffer heavy losses from hunting during molting season, August 2007.

People start hunting birds in spring, first baiting and snaring chukar partridges (*Alectoris chukar*) and Himalayan snowcocks² (*Tetraogallus himalayensis*), then as soon as they appear in the area, shooting rosy starlings (*Sturnus roseus*), black-bellied sandgrouse (*Pterocles orientalis*) and ‘doves’. European sparrowhawks (*Accipiter nisus*) are snared by apparently only a few expert catchers (Plate 4). Summer is the peak of water bird hunting, with hunters essentially capturing by hand molting ducks, coots and other birds. We believe that this activity is massively undertaken since it does not require possessing a weapon. One hunter mentioned that he was also snaring common quails (*Coturnix coturnix*), chukar partridges and kingfishers (*Alcedo atthis*) at this season. In autumn ducks and other water birds are shot more occasionally by those who have shotguns. Sparrowhawks may also be captured again, and ibex are actively hunted. Canids are hunted for their pelt in winter and opportunistically as retaliation to poultry/livestock predation in other seasons (Plate 5). Ibex are harvested for their meat which is dried and salted to be consumed during winter. All bird species are hunted for food, except quails, sparrowhawks, kingfishers, song bird species, and to some extent, chukar partridges. Those are usually captured alive and traded in animal markets. For 37 out of the 49 (75%) interviewees, hunting in the area is the fact of local people, while 10 (21%) claimed it is practiced by both local people and outsiders from neighboring districts and provinces. Eventually 2 (4%) respondents unconvincingly stated that outsiders only hunted in the area. All interviewed people reckoned hunting pressure had decreased in the area for the past 2–4 years. For 15 of them (31%), the main reason for this decrease was the hunting ban promulgated by the central authority in Kabul, for 6 (12.2%) it was more related to the risk of catching diseases such as avian influenza which was advertised to them by local authorities, whereas for 11 (22%) it was probably due to the combination of both factors. Eventually 17 (35%) had no opinion about the origin of the observed decrease. We think two more causes may be invoked. With an increased political stability in the country for the past 4 years, more time might have been devoted to agricultural works, thus reducing time previously dedicated to hunting. Also during the past four years, the main lake has dried by the beginning of summer and presumably few water birds may have stayed for molt in the area. It is difficult to estimate the impact of mass-captures on the populations of water birds that use the lake in ‘high-water-years’. Virtually all water bird species are targeted. We recorded captured coots (*Fulica atra*), common teals (*Anas crecca*; Plate 6) and great crested grebes (*Podiceps cristatus*; Plate 7). The four hunters who admitted catching water birds in summer killed on average 15–35 specimens per season. Extrapolated to an estimated 1500 hunters (based on the number of inhabitants in the area excluding women, children less than 12, elder people and adult males intensively involved in agricultural works or other activities), an estimated 20,000 to 50,000 birds could have been captured by hand in summer 2007.

² We did not observe this species during our surveys and Habibi (2007) does not report it in its compilation. We have therefore not included the species in the global bird list for the area.



Plate 9. A flock of greater flamingoes (*Phoenicopterus roseus*) over Ab-e Nawar in, Dasht-e Nawar, August 2007. We confirmed the breeding of this species 30 years after the last report.

It was our impression that coots in particular were captured in large numbers. One group of three hunters brought back to the village 11 of them captured during one afternoon (Plate 8). No mention was made of egg collection activities. Interviewees mentioned that for religious reasons flamingoes, egrets, cranes, other herons and hares are not hunted (see below).

Birds

Greater flamingo

In April the water level in Ab-e Nawar was almost 1-m high in several areas with 60–80 greater flamingoes present, yet no early breeding activity was recorded. On 4 August, we observed several herds totalling 298 juveniles attended by 165 immature and adult birds. Other immature and adult birds were present in the southern and eastern reaches of the lake and we estimated the total flamingo population at about 850 individuals (Plate 9). We also visited an island with typical flamingo nests made of truncated mounds of mud, some of them bearing non-hatched eggs. According to our interviews, 75% of the respondents considered the greater flamingo as an important bird species of their environment and a part of their cultural patrimony. Forty-nine percent of them believed that flamingoes were present in their area every year, but nearly 80% of interviewees also reckoned that their numbers had decreased dramatically in the last 10 years or more, because of repeated droughts and chronic lack of water in the basin. Local inhabitants neither hunt flamingoes nor disturb them as they associated the pink color of their plumage with the blood of the martyred Imam Hussein (Shank and Rodenburg, 1977). In Iran, the flamingo can locally be called ‘Mourgh-e Hussein’, literally the ‘chicken of Hussein’ (Ostrowski, pers. obs.). Noteworthy three respondents to the questionnaire mentioned that in 2006 people from the Jaghori district came into the area, captured two flamingoes alive and took them back to their home. For long time Dasht-e-Nawar was known to be a unique, high-elevation breeding ground for greater flamingo (Shank and Rodenburg, 1977).

Indeed, in summer 2007 we observed more than 30 years after the last report that the greater flamingo still breeds in this area, known as the highest haunt for the species. In western Asia, the greater flamingo breeds in local and discontinuous colonies, sometimes located at high altitude as it is observed in Afghanistan but invariably associated with brackish, salt-water or alkaline lakes. Because of this highly precarious breeding habitat, the species demography is dependent of stochastic events, such as fluctuations of water levels. As a matter of fact the greater flamingo is known to breed irregularly throughout its range and may fail to reproduce for several successive years. As its water supply largely depends on spring snow melt in the surrounding mountains, Ab-e-Nawar, the main body of water in Dasht-e-Nawar, can go completely dry by the mid of summer and jeopardize the breeding success of flamingoes. Greater flamingoes were first reported to occur in large numbers in Dasht-e Nawar in 1965 by German zoologists G. and J. Niethammer (cited in Klockenhoff and Madel, 1970). Subsequently, the species was confirmed to breed in this site almost every year between 1969 and 1975 (Petocz and Habibi, 1975). After the beginning of the Soviet war in Afghanistan in 1979, a long period of war started in the country and Dasht-e Nawar was no longer visited by scientists until September 2002, when a UNEP post conflict team found that the lake basin was dry (UNEP, 2003). In April 2006 a mission led by R. Petocz counted up to 2500 birds but in relatively shallow water, and by the end of June the lake was dry and birds had vanished, failing to breed. According to Petocz (2006) the lake basin had dried out in summer during the previous four years. Reports of heavy snowfalls in Ghazni Province during winter 2006–2007 (Rajabi and Noori, pers. obs.) proved genuine as by August 2007 most of the lake was still flooded and flamingoes succeeded breeding. Obviously a pivotal threat to the long-term survival of the flamingo population is the extensive diversion of inflowing waters for irrigation and human uses (Petocz, 2006). Greater flamingoes observed in Dasht-e Nawar are migratory birds which arrive in late March to April and depart in early October. Little is known about the winter grounds of this population although several authors have hypothesized it could be in Pakistan or in the Seistan marshes in Fars Province, Afghanistan.

Other water birds

Dasht-e Nawar is said to receive thousands of migratory water birds of various species each year. In early September 2002, a UNEP survey confirmed the presence of several species of ducks, including pochards (*Aythya ferina*), mallards (*Anas platyrhynchos*), and large flocks of teals (*Anas* sp.) (UNEP, 2003). The area is also a remarkable breeding site for water birds. Besides greater flamingoes, Shank and Rodenburg (1977) reported avocet (*Recurvirostra avosetta*), redshank (*Tringa totanus*), greater sand plover (*Charadrius leschenaultii*), and common tern (*Sterna hirundo*) breeding in Dasht-e Nawar. During our 2007 summer mission we confirmed the breeding status of avocet and redshank, but also of coot (Plate 10), common moorhen (*Gallinula chloropus*), common teal, great crested grebe (Plate 11), and black-winged stilt (*Himantopus himantopus*) (Plate 12).



From top, counterclockwise: Plate 10. A juvenile coot (*Fulica atra*) found in the reed beds in Dasht-e Nawar, August 2007. Plate 11. A juvenile great crested grebe (*Podiceps cristatus*) in the reed beds in Dasht-e Nawar, August 2007. This species is a new addition to the bird list of Dasht-e Nawar, and is for the first time confirmed to breed in central highlands of Afghanistan. Plate 12. A newly-fledged black-winged stilt (*Himantopus himantopus*) found dead of unknown reason, August 2007. The species was already recorded to breed in Dasht-e Nawar in the 1970s.

Ornithologists from former Soviet Union have considered the waterfowl populations occurring in most parts of Afghanistan during autumn migration as part of a 'Siberian–Kazakhstan/Pakistan–India' biogeographic unit. This population breeds in and around the Ob River of northern Russia and winters in the Indus river drainage (Isakov and Shevarera, 1967, cited in Shank and Rodenburg, 1977). Although very few ornithological surveys have been carried out in Afghanistan, anecdotic observations support this earlier delineation. The Siberian crane (*Grus leucogeranus*) for example has been recorded in Ab-e Estada (Shank and Rodenburg, 1977).



From left to right: Plate 13. A large diversity of diurnal raptors can be seen in Dasht-e Nawar. Here, the huge lammergeier (*Gypaetus barbatus*), known to occur throughout central highlands of Afghanistan. Dasht e-Nawar, April 2007. Plate 14. An adult specimen of the small and compact booted eagle (*Hieraetus pennatus*) in clear color morph, August 2007. The status of this species in Dasht-e Nawar is unclear, a summer visitor, breeder or early migrator? The species is also a new addition to the bird list of Dasht-e Nawar.

There is little doubt that because of their paucity in the country, sizeable wetlands, such as Dasht-e-Nawar, which provide extensive resting and foraging habitat, must be of crucial importance for migrating water birds.

Overall list

During our 2007 surveys, we sighted 92 bird species—with an additional 2 of questionable identification—adding 40 species to the bird list of Dasht-e Nawar compiled by Habibi (2007). The updated list now amounts to 142 species (Table 1): 52 (37%) are assimilated to water birds at large, 90 (63%) are non water birds, 16 (11%) being raptors (Plate 13 & Plate 14). Using our observations, the results of the interviews in Dasht-e Nawar and in other areas in Afghanistan, as well as available literature (Rasmussen and Anderton, 2005), we have attempted to clarify the status of the birds occurring in the area and to determine the biome in which they predominate. We believe 68 (48%) species breed in the area, and 28 (20%) are potential breeders. We also estimate that less than 15% of recorded species reside in the area. Owing to the harsh winter climatic conditions typical of Afghanistan central highlands, most species leave the area in autumn. Forty-eight species (33.8%) seem to be strictly restricted to the wetland ecosystem (biome 3), 29 (20.4%) occur in wetland and inhabited/cultivated lands (biome 2), 28 (19.7%) use mountains (biome 1) and inhabited/cultivated lands, 15 (10.5%) seem to be restricted to inhabited/cultivated lands, 10 (7%) to mountainous areas, and finally 12 (8.4%) are not biome-restricted and utilize all available ecosystems.

Table 1. Taxonomic list of bird species observed in Dasht-e Nawar by the WCS Ecosystem Health Team in April 2007 (1) and in July–August 2007 (2), or reported by Habibi (2007) (3), with their status and biome use.

Common name	Genus	Status	Biome	Reference
Great crested grebe	<i>Podiceps cristatus</i>	MB ^c	Wetland	2
Black-crowned night heron	<i>Nycticorax nycticorax</i>	M, MB?	Wetland/Agric.	1
Grey heron	<i>Ardea cinerea</i>	MB	Wetland	1, 2, 3
Little egret	<i>Egretta garzetta</i>	MB?	Wetland	2, 3
Great egret	<i>Egretta alba</i>	MB	Wetland	1, 2, 3
Greater flamingo	<i>Phoenicopterus roseus</i>	MB ^c	Wetland	1, 2, 3
White stork	<i>Ciconia ciconia</i>	M, S, MB?	Wetland	2, 3
Demoiselle crane	<i>Grus virgo</i>	M	Wetland/Agric.	3
Greylag goose	<i>Anser anser</i>	M, W	Wetland	1
Ruddy shelduck	<i>Tadorna ferruginea</i>	M, MB?	Wetland	3
Common shelduck	<i>Tadorna tadorna</i>	M	Wetland	3
Mallard	<i>Anas platyrhynchos</i>	M, MB?	Wetland	1, 2, 3
Shoveler	<i>Anas clypeata</i>	M, MB?	Wetland	2, 3
Pintail	<i>Anas acuta</i>	M, MB?	Wetland	1, 3
Wigeon	<i>Anas penelope</i>	M, MB?	Wetland	3
Teal	<i>Anas crecca</i>	MB ^c	Wetland	2, 3
Marbled teal	<i>Marmaronetta angustirostris</i>	V	Wetland	3
Gadwall	<i>Anas strepera</i>	M, MB?	Wetland	3
Garganey	<i>Anas querquedula</i>	M	Wetland	3
Pochard	<i>Aythya ferina</i>	M, MB?	Wetland	3
Lammergeier	<i>Gypaetus barbatus</i>	RB	Mountain	1, 2
Egyptian vulture	<i>Neophron percnopterus</i>	RB	Mountain/Agric.	1, 2, 3
Griffon vulture	<i>Gyps fulvus</i>	RB	Mountain/Agric.	2
Eurasian sparrowhawk	<i>Accipiter nisus</i>	M	Agric.	1
Common buzzard	<i>Buteo buteo</i>	M	Wetland/Mountain/Agric.	3
Long-legged buzzard	<i>Buteo rufinus</i>	RB ^c	Wetland/Mountain/Agric.	1, 2
Steppe eagle	<i>Aquila nipalensis</i>	M	Wetland/Mountain/Agric.	3
Golden eagle	<i>Aquila chrysaetos</i>	RB	Mountain	1, 2
Bonelli's eagle	<i>Hieraaetus fasciatus</i>	M, MB?	Mountain/Agric.	3
Booted eagle	<i>Hieraaetus pennatus</i>	M, MB?	Mountain/Agric.	2
Merlin	<i>Falco columbarius</i>	M, W	Agric./Wetland	2
Lesser kestrel	<i>Falco naumanni</i>	M	Agric.	2?
Kestrel	<i>Falco tinnunculus</i>	RB ^c	Wetland/Mountain/Agric.	1, 2, 3
Red-footed falcon	<i>Falco vespertinus</i>	M	Wetland/Mountain/Agric.	2?, 3
Saker falcon	<i>Falco cherrug</i>	M, W	Wetland/Mountain/Agric.	1, 3
Pallid harrier	<i>Circus macrourus</i>	M	Wetland/Agric.	3
Chukar	<i>Alectoris chukar</i>	RB ^c	Mountain/Agric.	1
Common quail	<i>Coturnix coturnix</i>	MB	Mountain/Agric.	1, 2
Coot	<i>Fulica atra</i>	MB ^c , RB?	Wetland	1, 2, 3

Common moorhen	<i>Gallinula chloropus</i>	MB ^c	Wetland	2
Pied avocet	<i>Avocetta recurvirostra</i>	MB ^c	Wetland	2, 3
Turnstone	<i>Arenaria interpres</i>	M	Wetland	3
Kentish plover	<i>Charadrius alexandrinus</i>	MB?	Wetland	3
Common ringed plover	<i>Charadrius hiaticula</i>	M	Wetland	3
Little ringed plover	<i>Charadrius dubius</i>	MB	Wetland	2, 3
Lesser sand plover	<i>Charadrius mongolus</i>	MB	Wetland	1, 2, 3
Greater sand plover	<i>Charadrius leschenaultii</i>	MB?	Wetland	1, 2, 3
Common snipe	<i>Gallinago gallinago</i>	M	Wetland	1
Whimbrel	<i>Numenius phaeopus</i>	M	Wetland	3
Eurasian curlew	<i>Numenius arquata</i>	M	Wetland	3
Little/Temminck stint	<i>Calidris minuta/temminckii</i>	M	Wetland	1, 3
Curlew sandpiper	<i>Calidris ferruginea</i>	M	Wetland	3
Dunlin	<i>Calidris alpina</i>	M	Wetland	3
Ruff	<i>Philomachus pugnax</i>	M	Wetland	1, 3
Greenshank	<i>Tringa nebularia</i>	M	Wetland	2
Wood sandpiper	<i>Tringa glareola</i>	M	Wetland	2, 3
Green sandpiper	<i>Tringa ochropus</i>	M	Wetland	3
Redshank	<i>Tringa totanus</i>	MB ^c	Wetland	2, 3
Spotted redshank	<i>Tringa erythropus</i>	M	Wetland	3
Terek sandpiper	<i>Tringa cinerea</i>	M	Wetland	3
Common sandpiper	<i>Actitis hypoleucos</i>	MB	Wetland/Agric.	1, 2, 3
Black-winged stilt	<i>Himantopus himantopus</i>	MB ^c	Wetland	2, 3
Cream-colored courser	<i>Cursorius cursor</i>	MB?	Wetland/Agric.	3
Common tern	<i>Sterna hirundo</i>	MB	Wetland	2, 3
Gull-billed tern	<i>Sterna nilotica</i>	MB	Wetland	2, 3
Whiskered term	<i>Chlidonias hybrida</i>	MB	Wetland	3
Black tern	<i>Chlidonias niger</i>	MB	Wetland	3
Slender-billed gull	<i>Larus genei</i>	MB?	Wetland	3
Heuglin's gull	<i>Larus heuglini</i>	MB?	Wetland	2, 3(?)
Common black-headed gull	<i>Larus ridibundus</i>	S, MB?	Wetland	1, 2, 3
Black-bellied sandgrouse	<i>Pterocles orientalis</i>	MB?	Mountain/Agric.	2, 3
Rock dove	<i>Columba livia</i>	RB	Mountain/Agric.	1, 2
Stock pigeon	<i>Columba oenas</i>	?	Mountain/Agric.	3
Hill pigeon	<i>Columba rupestris</i>	MB?	Mountain	2
Eastern stock dove	<i>Columba eversmanni</i>	MB?	Mountain/Agric.	3
Common cuckoo	<i>Cuculus canorus</i>	MB	Agric.	2
Common swift	<i>Apus apus</i>	MB	Mountain/Agric.	1, 2, 3
Alpine swift	<i>Tachymarptis melba</i>	MB	Mountain	2
European bee-eater	<i>Merops apiaster</i>	MB	Agric.	2
European roller	<i>Coracias garrulus</i>	MB	Agric.	1, 2, 3
European kingfisher	<i>Alcedo atthis</i>	MB ^c	Wetland/Agric.	1, 2
Hoopoe	<i>Upupa epops</i>	MB ^c	Agric.	1, 2, 3

Wryneck	<i>Jynx torquilla</i>	M	Agric.	1
Hume's short-toed lark	<i>Calandrella acutirostris</i>	MB	Mountain/Agric.	1, 2, 3
Short-toed lark	<i>Calandrella cinerea</i>	M	Mountain/Agric.	3
Lesser short-toed lark	<i>Calandrella rufescens</i>	?	Mountain/Agric.	3
Shore lark	<i>Eremophila alpestris</i>	RB	Mountain/Agric.	1, 2, 3
Eurasian skylark	<i>Alauda arvensis</i>	M, W?	Mountain/Agric.	3
Small skylark	<i>Alauda gulgula</i>	MB	Mountain/Agric.	1, 2
Crested lark	<i>Galerida cristata</i>	RB	Mountain/Agric.	1, 2, 3
Bimaculated lark	<i>Melanocorypha bimaculata</i>	MB	Mountain/Agric.	1, 2
Desert lark	<i>Ammomanes deserti</i>	M	Agric.	3
Crag martin	<i>Ptyonoprogne rupestris</i>	MB	Agric./Wetland	1, 2, 3
Barn swallow	<i>Hirundo rustica</i>	MB	Agric./Wetland	2
Citrine wagtail	<i>Motacilla citreola</i>	MB	Agric./Wetland	1, 2, 3
White wagtail	<i>Motacilla alba</i>	RB?	Agric./Wetland	1, 2, 3
Grey wagtail	<i>Motacilla cinerea</i>	MB	Agric./Wetland	2, 3
Tawny pipit	<i>Anthus campestris</i>	MB?	Agric./Wetland	3
Long-billed pipit	<i>Anthus similis</i>	M	Agric./Wetland	3
Water pipit	<i>Anthus spinoletta</i>	W	Agric./Wetland	3
Rock thrush	<i>Monticola saxatilis</i>	MB	Mountain	3
Blue rock thrush	<i>Monticola solitarius</i>	MB	Mountain	3
Black redstart	<i>Phoenicurus ochruros</i>	MB	Agric.	2, 3
Bluethroat	<i>Luscinia svecica</i>	MB	Agric./Wetland	1, 2, 3
Northern wheatear	<i>Oenanthe oenanthe</i>	M	Agric./Wetland	3
Desert wheatear	<i>Oenanthe deserti</i>	M	Mountain/Agric./Wetland	3
Isabelline wheatear	<i>Oenanthe isabellina</i>	MB	Mountain/Agric./Wetland	1, 2, 3
Red-tailed wheatear	<i>Oenanthe xanthopyrma</i>	MB	Mountain/Agric./Wetland	2, 3
Finsch's wheatear	<i>Oenanthe finschi</i>	M	Mountain/Agric./Wetland	3
Common stonechat	<i>Saxicola torquata</i>	MB	Agric./Wetland	1, 3
Upcher's warbler	<i>Hippolais languida</i>	MB?	Agric./Wetland	3
Plain-leaf warbler	<i>Phylloscopus neglectus</i>	MB?	Agric./Wetland	3
Green warbler	<i>Phylloscopus nitidus</i>	MB	Agric./Wetland	3
Lesser whitethroat	<i>Sylvia curruca</i>	M	Agric./Wetland	3
Hume's whitethroat	<i>Sylvia althaea</i>	MB	Agric./Wetland	1
Desert whitethroat	<i>Sylvia minula</i>	?	Agric./Wetland	3
Eastern rock nuthatch	<i>Sitta tephronata</i>	RB	Mountain	2
Indian golden oriole	<i>Oriolus kundoo</i>	MB	Agric.	1, 2
Red-backed shrike	<i>Lanius collurio</i>	M?	Agric.	2, 3
Long-tailed shrike	<i>Lanius schach</i>	MB ^c	Agric.	2, 3
Magpie	<i>Pica pica</i>	RB ^c	Agric.	1, 2
Red-billed chough	<i>Pyrrhocorax pyrrhocorax</i>	RB	Mountain	2
Carrion crow	<i>Corvus orientalis</i>	RB ^c	Mountain/Agric./Wetland	2, 3
Hooded crow	<i>Corvus cornix</i>	?	Mountain/Agric./Wetland	1
Raven	<i>Corvus corax</i>	RB	Mountain	1, 2, 3

Rosy starling	<i>Stumus roseus</i>	MB ^c	Agric.	1, 2
House sparrow	<i>Passer domesticus</i>	RB ^c	Agric./Wetland	1, 2, 3
Tree sparrow	<i>Passer montanus</i>	RB ^c	Agric./Wetland	1, 2
Afghan snowfinch	<i>Pyrgilauda theresae</i>	RB	Mountain/Agric.	1, 2, 3
Goldfinch	<i>Carduelis carduelis</i>	M	Agric.	1
Red-fronted serin	<i>Serinus pusillus</i>	RB?	Mountain/Agric.	1, 2
Linnet	<i>Carduelis cannabina</i>	M	Mountain/Agric.	1
Twite	<i>Carduelis flavirostris</i>	RB	Mountain/Agric.	2, 3
Crimson-winged finch	<i>Rodopechys sanguinea</i>	MB	Mountain/Agric.	1, 2
Desert finch	<i>Rhodospiza obsoleta</i>	?	Mountain/Agric.	2
Mongolian finch	<i>Rhodopechys mongolica</i>	RB	Mountain/Agric.	2, 3
Trumpeter finch	<i>Buccanetes gitaginea</i>	RB	Mountain/Agric.	3
Common rosefinch	<i>Carpodacus erythrinus</i>	MB	Agric./Wetland	1, 2
Snowfinch	<i>Montifringilla nivalis</i>	RB	Mountain/Agric.	1, 2, 3
Black drongo	<i>Dicurus macrocercus</i>	V	Agric./Wetland	3
Rock bunting	<i>Emberiza cia</i>	MB?	Mountain	3
Red-headed bunting	<i>Emberiza buniceps</i>	MB?	Agric./Wetland	2

Status: MB=Migratory Breeder; RB=Resident Breeder; W=Winter Visitor; S=Summer Visitor; M=Migratory; ^cConfirmed breeding in 2007.

Important bird species according to inhabitants

Interviewed people considered 26 bird species as important in the area (Table 2). The identity of 12 of these birds, such as 'ducks', 'white egrets' or 'buzzards' could not be determined to the species level. The greater flamingo, considered by most foreign visitors as a very important species in the area, came only in fourth place behind 'ducks', 'white egrets', and chukar partridge. Noticeably, four of the six (67%) species considered as most important (>50% respondents) and only four of the 18 (22%) least important species (<20% respondents) were actively hunted in the area, suggesting that the criteria of importance were strongly influenced by the 'economical value' of the species. Not surprisingly, the Afghan snowfinch (*Pyrgilauda theresae*) known as the only true endemic bird species in Afghanistan, and as such a species of great interest to conservationists, does not appear in the list. Although relatively common, the Afghan snowfinch is discrete in its behavior and rather of featureless appearance. It is apparently not captured for food or to be kept as a song bird. Three respondents believed that 'cranes' were important bird species in the area. They all agreed that 'cranes' visit the area in large flocks but during a very short period, sometimes less than a week, and always in spring. Ornithological reports dating back to the 70's suggested that Dasht-e Nawar is an important stop-over for Demoiselle cranes (*Grus virgo*) (Petocz, 2006). No mention was made of the Siberian crane (*Grus leucogeranus*), although the species is known to have occurred in the 1970s in autumn in Ab-e Estada (Shank and Rodenburg, 1977).

Table 2. List by ranking order of most prominent bird species in Dasht-e Nawar according to 49 interviews.

Species	Spring interview	Summer interview	Global result	Status	Hunted
'Ducks'	22/23	24/26	46/49	M, MB, W	Yes
'White egrets'	22/23	19/26	41/49	MB	No
Chukar partridge	18/23	21/26	39/49	RB	Yes
Greater flamingo	17/23	20/26	37/49	MB	No
Common quail	15/23	21/26	36/49	MB	Yes
Coot	4/23	21/26	25/49	MB, RB?	Yes
Eurasian Sparrowhawk	14/23	5/26	19/49	M	Yes
'Buzzards'	4/23	12/26	16/49	M, RB	No
Himalayan snowcock	4/23	5/26	9/49	RB	Yes
'Vultures'	6/23	2/26	8/49	?	No
'Crows'	1/23	6/26	7/49	RB?	No
Black-bellied sandgrouse	0/23	6/26	6/49	MB?	Yes
Rosy starling	4/23	2/26	6/49	MB	Yes
European kingfisher	4/23	0/26	4/49	MB	No
'Doves'	2/23	2/26	4/49	?	Yes
'Cranes'	1/23	2/26	3/49	M	No
Goldfinch	3/23	0/26	3/49	M	Yes
Magpie	2/23	1/26	3/49	RB	No
'Pelicans'	2/23	1/26	3/49	S	No
'Hérons'	0/23	2/26	2/49	MB	No
Hoopoe	1/23	1/26	2/49	MB	No
Horned lark	2/23	0/26	2/49	RB	No
White stork	0/23	1/26	1/49	M, S, MB?	No
'Terns'	0/23	1/26	1/49	MB	No
Roller	0/23	1/26	1/49	MB	No
'Falcons'	0/23	1/26	1/49	MB	No

Status: MB=Migratory Breeder, RB=Resident Breeder, W=Winter Visitor, S=Summer Visitor, M=Migratory

As in many other places in Afghanistan Eurasian sparrowhawks are traditionally captured by local people to be used as hawking birds (Ostrowski, pers. obs). We witnessed such practice in April. Nine interviewees said that during 'Taliban times' and up to two years ago people were coming from Kandahar and even Pakistan to capture sparrowhawks and falcons in the area, but this has apparently not occurred during the past two years. Overall, the qualitative assemblage of prominent bird species as proposed by respondents matched our general understanding of the avifauna of Dasht-e Nawar, to the exception of pelicans, which have never been reported by foreign visitors.



From left to right: Plate 15. Alpine ibex (*Capra [ibex] sibirica*) horns decorate the roof of a religious shrine in Dasht-e Nawar, April 2007. Plate 16. Detail of an Alpine ibex horn embedded in the wall coating of a religious shrine in Dasht-e Nawar, April 2007.

Occurrence of mammals

Questionnaire results

- Cape hare (*Lepus capensis*): All interviewees told that hares occur in the area, mostly in the surrounding mountains, in relatively low numbers. Two respondents however mentioned that they are more numerous around Bukharah village. For religious reasons the species is usually not hunted by local people.
- Afghan pika (*Ochotona rufescens*) or ground squirrel (*Spermophilus fulvus*): Most respondents mentioned that 'big mice' are common in the area, active in spring and summer, usually during day.
- Alpine ibex (*Capra [ibex] sibirica*): All interviewees acknowledged that the species occurs in the surrounding mountains but in decreasing numbers. According to six respondents, ibex are heavily hunted for meat. People mentioned that ibexes are still present in Safed Koh, Shar Kalan, Wula, Kuba, Gul Koh, and Koh-e Wagh mountains. During our surveys, we often saw ibex skulls and horns ornamenting the entrances of prosperous houses or religious shrines (Plate 15 & 16).
- Afghan urial (*Ovis orientalis cycloceros*): This species no longer exists in the area according to the 49 interviewees.
- Red fox (*Vulpes vulpes*): All respondents considered this species as very common in the area and particularly in the plain. In spring it is visible during day but retrieves to nocturnal life in summer when ambient temperature is high. It sometimes visits villages in winter but most often forages on water birds, their chicks and eggs. The red fox is frequently hunted as retaliation to poultry predation or for its pelt.
- Wolf (*Canis lupus*): All respondents considered the species as common. In Dasht-e Nawar wolves' haunts are located in mountains surrounding the plain, especially

in Safed Koh mountain range. They are essentially nocturnal and may descend to the plain in any season, although their numbers seem to increase in the plain and in the vicinity of villages in autumn and winter. As for red foxes, they are frequently hunted by local inhabitants because they are said to prey unattended livestock or for their pelt which has an appreciable commercial value. One respondent also mentioned that wolves and jackals are disliked because they often dig out recently buried people.

- Golden jackal (*Canis aureus*): All respondents reported the species as common in the area. Their range use is apparently seasonal following the same pattern as wolves. Like the other canids, they are hunted when encountered.
- Leopard (*Panthera pardus*): Four out of the 49 respondents believed the species is still present in the surrounding mountains but in the very remote areas of Safed Koh and Wagh mountain ranges. Eleven mentioned that the species was present until as recently as five years ago in the surrounding mountains but that it does not occur any longer. Eventually 35 respondents did not know of the species occurring in the area even in the past.
- Snow leopard (*Uncia uncia*): According to all respondents this species does not occur in the area.
- Caracal (*Caracal caracal*) and lynx (*Lynx lynx*): Eight respondents believed that medium-sized wild cats resembling caracals occur in the area. They are seen most often in mountains but also on rare occasions in tall grasses of the wetland during spring and summer when hunting water birds. A total of 41 respondents did not recognize the species as belonging to the local fauna.
- Pallas's cat (*Otocolobus manul*) and wild cat (*Felis silvestris*): 30 respondents reported the occurrence of 'small wild cats' in the area mainly in surrounding mountains and occasionally in the plain.
- Striped hyena (*Hyena hyena*): 41 respondents said that the species occurs in the surrounding mountains although it is uncommon to rare and seldom visits the plain. It is not specifically hunted.
- Stone marten (*Martes foina*): It was the only mustelidae species reported as occurring in the area by 38 of the interviewees. The majority of them believed that the species is rare and restricted to the mountain areas most of the year except in winter when it may be encountered near villages. On several occasions stone martens have been found trapped in poultry enclosures while attempting to prey on chickens. In such circumstances the intruder was usually killed as its pelt can be sold for high value in fur markets.
- Brown bear (*Ursus arctos*): 46 interviewees answered that this species does not occur in the area. Three respondents claimed that brown bears occurred in the past (>25 year-ago), in surrounding mountain areas.



From top left, clock wise: Plate 17. An Afghan pika (*Ochotona rufescens*) sunbathing in agricultural fields around Bukharah village, Dasht-e Nawar, April 2007. Plate 18. A red fox (*Vulpes vulpes*) sleeping in open land on the fringe of wet grasslands (biome 3) near Nawabad, Dasht-e Nawar, April 2007. Plate 19. An anesthetized Pallas' cat (*Otocolobus manul*) at Kabul zoo, in November 2006. This specimen was allegedly captured in autumn 2006 in Nawar district. Plate 20. A specimen of vole, presumably an Afghan vole (*Microtus afghanus*) captured in agricultural fields in Dasht-e Nawar, August 2007.

- Indian crested porcupine (*Hystrix indica*): 26 respondents reported that the species is common in the mountain areas surrounding the plain. They are rarely observed in the plain itself but in autumn when they descend from their higher reaches to dig out potato fields. They become then nocturnal pests and are actively chased out of cultivated lands when encountered.
- Marmot: 38 interviewees said that marmots, most probably long-tailed marmots (*Marmota caudata*) are present around Dasht-e Nawar, particularly in Do Abi district. They seem to descend at lower altitudes at the end of summer but rarely as far as the vicinity of villages.
- Hedgehog (*Hemiechinus* sp.): Seven respondents mentioned that a 'very small porcupine' species is common in the area. We believe they referred to a hedgehog species.

Direct observations

- Afghan pika (*Ochotona rufescens*): We observed on two occasions in April a single specimen of Afghan pika sunbathing in agricultural fields around Bukharah (biome 2) (Plate 17). We presume the species is common in the area.

Table 3: List of mammal species in Dasht-e Nawar according to 49 interviews and direct observations carried out in spring and summer 2007 by WCS Health Team.

Order	Family	Genus and species	Likelihood of occurrence*
Lagomorpha	Leporidae	<i>Lepus capensis</i>	Very high
	Ochotonidae	<i>Ochotona rufescens</i>	Direct observation
Artiodactyla	Bovidae	(<i>Capra [ibex] sibirica</i>)	Very high
		<i>Ovis orientalis cycloceros</i>	Very low
Carnivora	Canidae	<i>Vulpes vulpes</i>	Direct observation
		<i>Canis aureus</i>	Very high
		<i>Canis lupus</i>	Foot prints found
	Felidae	<i>Panthera pardus</i>	Medium low
		<i>Uncia uncia</i>	Very low
		<i>Caracal caracal</i>	Medium low
		<i>Lynx lynx</i>	Medium low
		<i>Otocolobus manul</i>	Direct observation
		<i>Felis silvestris</i>	Medium high
		<i>Prionailurus bengalensis</i>	Data deficient
	Hyaenidae	<i>Hyena hyena</i>	Very high
	Mustelidae	<i>Martes foina</i>	Medium high
		<i>Lutra lutra</i>	Data deficient
	Ursidae	<i>Ursus arctos</i>	Very low
Rodentia	Hystriidae	<i>Hystrix indica</i>	Old feces found
	Sciuridae	<i>Marmotta caudata</i>	Medium high
		<i>Spermophilus fulvus</i>	Data deficient
	Cricetidae	<i>Microtus (afghanus?)</i>	Direct observation
Insectivora	Erinaceidae	<i>Hemiechinus sp.</i>	Data deficient

*Likelihood of occurrence was determined according to the number of interviewees positive that the species occurs in the area. Very high likelihood: $\geq 90\%$; medium high likelihood: $\geq 50\%$ and $< 90\%$; medium low likelihood: $> 10\%$ and $< 50\%$, very low likelihood: $\leq 10\%$.

- Red fox (*Vulpes vulpes*): In April we observed one individual sleeping in open land on the fringe of wet grasslands (biome 3) near Nawabad (Plate 18). Near Bukharah we also found two specimens killed by inhabitants as retaliation to recent predation of poultries (biome 2). During summer we recorded foot prints and found scats in biomes 2 and 3.
- Wolf (*Canis lupus*): We observed fresh foot prints of a wolf in surrounding mountains (biome 1) in April.

- Pallas's cat (*Otocolobus manul*): In April Dr Ali Madad Rajabi saw a molting specimen of 'small cat' that he recognized as a Pallas's cat. He surprised the cat sunbathing at the fringe of a rocky area far from any village (biome 1/3). The cat reacted very wildly when it noticed him and quickly fled to surrounding rocks. Dr. Rajabi has a good knowledge of Afghan Pallas's cats as he handled in November 2006 four specimens received at the Kabul zoo in September of the same year. Two of these specimens were said to originate from Nawar District (Plate 19).
- Indian crested porcupine (*Hystrix indica*): We found old feces in agricultural fields near Bukharah on 26 April.
- Vole (*Microtus* sp.): We collected one specimen in biome 2 in July. Preliminary measurements point to an Afghan vole (*Microtus afghanus*), but definitive identification requires confirmation (Plate 20).

Overall list

Overall 12 mammal species were observed or have a high probability of occurrence in Dasht-e Nawar area according to the interviews (Table 3). All interviewed local people were positive that Afghan urial no longer exists in the mountains surrounding Dasht-e Nawar, and most of them believed it is also the case for the leopard. Wolf and jackals are present in the area, presumably in good numbers. The assemblage of species broadly matches the species distribution compiled by Habibi (2003). However, the few discrepancies are worth discussing. For example, Habibi (2003) did not report sightings of Pallas's cat in Dasht-e Nawar, but our observations suggest this species occurs in the area. The occurrence of a 'medium-sized cat species' in Dasht-e Nawar area was also reported but neither caracal nor lynx have been previously recorded in this site. More investigations would hopefully clarify this issue. Nearly 85% of the interviewees said that hyenas occur in the surrounding mountains (although in reduced numbers). Such statement if confirmed would significantly extend the distribution of this species in Afghanistan which was not previously recorded in central highlands (Habibi, 2003). No mention was made by inhabitants of the common otter (*Lutra lutra*) and leopard cat (*Prionailurus bengalensis*). The former species lives along water courses at altitudes rarely exceeding 3000 m, Dasht-e Nawar with very few deciduous large water courses and an average altitude exceeding 3000 m does not seem to be suitable to this species, such as the leopard cat which is more expected to occur in forested areas. The status and variety in Dasht-e Nawar of small mammal species belonging to the Rodentia, Chiroptera and Insectivora orders is largely unknown and would deserve a specific survey. The biology of rodents would especially be interesting to study as several interviewees mentioned that 'mice' populations in the area go through some 'boom and burst' dynamics, and are subjected periodically to mass die-off. Such density dependent control factor on population size could be governed by infectious agents that have co-evolved with these populations (e.g. *Yersinia pestis*, the agent of plague), and may pose a zoonotic risk to human populations. We confirmed the presence of the Afghan pika but did not observe the ground squirrel reported to occur in the area by Habibi (2003).

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APPENDIX 1: SUMMARY OF DAILY ACTIVITIES

Spring survey (22 April to 2 May 2007)

- Sunday 22 April: Kabul to Ghazni — The team drove by taxi from Kabul to Ghazni, capital of Ghazni Province in central Afghanistan, purchased food and cooking gears in this city and rented a 4-wheel-drive-car.
- Monday 23 April: Ghazni to Dasht-e Nawar — The team departed Ghazni at 11:00, reached Dasht-e Nawar area at 15:00 and the village of Bukharah at 18:00.
- Tuesday 24 April: Bukharah village — The team introduced itself to the police authorities in the area and paid a visit to the local governor, explaining him the scopes of the work and introducing WCS.
- Wednesday 25 April: Surroundings of Bukharah village — Questionnaire survey of the area around Bukharah and examination of avifauna.
- Thursday 26 April and Friday 27 April: Surroundings of Bukharah village — The team was base-camped at Bukharah village, questioned households in the surroundings of this village, and investigated the local avifauna.
- Saturday 28 April: Bukharah village to Bai village — The team drove to Bai village, recorded the avifauna while traveling and settled in this new area.
- Sunday 29 April and Monday 30 April: Bai village — People from this village as well as from surroundings were interviewed. More avifauna observations were made.
- Tuesday 1 May: Bai village to Ghazni city — The team drove back to the local governor place (Duhabey), debriefed about the mission results with him and traveled to Ghazni.
- Wednesday 1 May: Ghazni to Kabul — The team drove back by taxi to Kabul in an uneventful return trip.

Summer survey (27 July to 10 August 2007)

- Friday 27 July: Kabul to Ghazni — The team drove by taxi from Kabul to Ghazni, capital of Ghazni Province in central Afghanistan, purchased food and rented a 4-wheel-drive-car.
- Saturday 28 July: Ghazni city — The team surveyed the human and veterinary medicine retailers to investigate which specialties and especially diclofenac are sold in Ghazni.
- Sunday 29 July: Ghazni to Dasht-e Nawar — The team departed Ghazni at 11:00 and reached Dasht-e Nawar area at 15:00.
- Monday 30 July: Nawabad village — The team moved from Bukharah to Nawabad village. People in this village were surveyed with questionnaires, different biomes

were investigated and molting water birds were captured for the Avian Influenza survey.

- Tuesday 31 July to Thursday 2 August: Nawabad village — The team extended the surveys and sampling operations for three consecutive days in the area of Nawabad.
- Friday 3 August: Nawabad to Sari Dariah village — The team moved from Nawabad to Sari Dariah village and repeated similar investigations and works.
- Saturday 4 August: Sari Dariah village — The team worked in Sari Dariah village and surroundings.
- Sunday 5 August: Sari Dariah to Bukharah village — The team moved from Sari Dariah village to Bukharah village and pursued investigations and bird sampling.
- Monday 6 August: Bukharah village to Nawabad area— The team moved from Bukharah to Nawabad village and interviewed people in Sabznallah Chawni, Wagh, and Sorkherma localities.
- Tuesday 7 August: Nawabad area to Qalai Balai Baiy— The team moved from Nawabad area to Qalai Balai Baiy village, interviewed people there and investigated surrounding lands.
- Wednesday 8 August: Qalai Balai Baiy to Doabi district— The team moved to Doabi district and met with the head of the district. More wildlife observations were made in this area.
- Thursday 9 August: Doabi district to Ghazni— The team moved back to the city of Ghazni.
- Friday 10 August: Ghazni to Kabul — The team drove back by taxi to Kabul in an uneventful return trip.