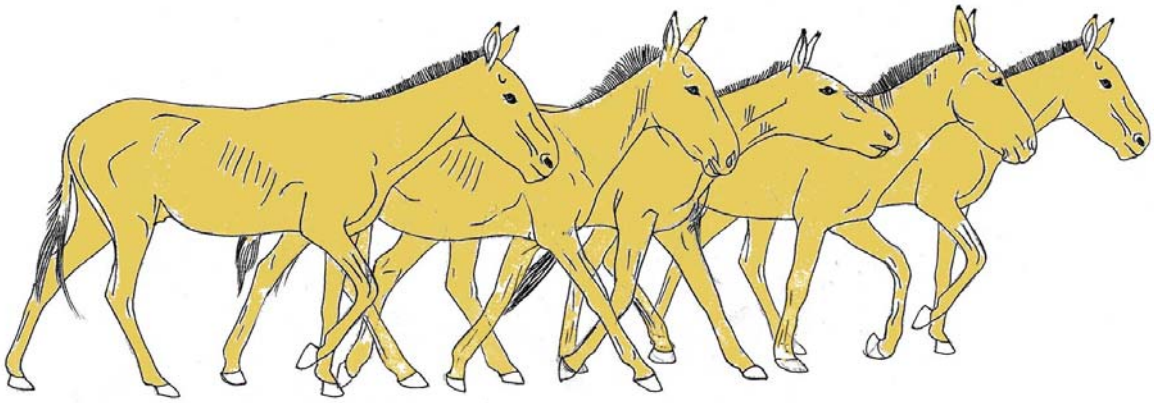
Landscape level research for the conservation of Asiatic wild ass in Mongolia

Report July 2007



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Asiatic Wild Ass and Wild Camel collaring mission in the Great Gobi A Strictly Protected Area in Mongolia

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June 2007

Photo: Petra Kaczensky

Within the framework of:

"Landscape level research for the conservation of Asiatic wild ass in Mongolia" funded by the Austrian Science Foundation (project P18624)
&
"Conservation of the Great Gobi Ecosystem and Its Umbrella Species Project" by UNDP

1. Introduction

Mongolia is an important stronghold of the Asiatic wild ass (*Equus hemionus,* khulan in Mongolian) and has a global responsibility to ensure their conservation. At the present time, Mongolia is anticipating the development of a commercialized agricultural sector that could cause a far greater intrusion of human activities into the Gobi environment than current pastoral livestock production. Development of other sectors of the Mongolian economy, especially mining and road construction, could also impact environmental security in general and habitat needs of the khulan and associated wildlife in particular.

The Great Gobi Strictly Protected Area (SPA) "A" located in the southwestern part of Mongolia bordering the People's Republic of China is one of the world's great desert ecosystems. The extremely harsh environment has given rise to a unique ecosystem with particularly well-adapted species, many of which are found nowhere else in the world. The large mammal fauna consists of several rare or globally threatened species, namely the wild Bactrian camel (*Camelus batrianus ferus*), the Gobi bear (*Ursus arctos gobiensis*), the snow leopard (*Uncia uncia*), the argali wild sheep (*Ovis ammon*) and the Asiatic wild ass (*Equus hemionus*).

Given its remoteness and the scarcity of water and pasture, the Great Gobi A Strictly Protected Area (SPA) is one of the few remaining large tracts of land where wildlife barely comes into contact with semi-nomadic pastoralists. We therefore selected this region as one of three focal areas to study khulan ecology and compare the spatial organization and habitat use with other areas more heavily utilized by people (*see report by Kaczensky and Walzer 2006*).

Yet human pressures for pastures and water on the edges of the Great Gobi SPA and in its buffer zones have substantially increased since the early 1990s and are believed to have led to significant habitat degradation in some areas. Thus in June 2003 a UNDP / GEF founded project "Conservation of the Great Gobi Ecosystem and its Endangered Species" was initiated. The wild Bactrian camel was identified as a focus species and efforts were made to gather data on camel movement patterns, habitat use and to assess the feasibility of establishing "corridors" between the Great Gobi A SPA and adjacent protected areas in Mongolia and China. Previous attempts to capture camels had proven difficult and this situation was compounded by collar failures following the capture of 3 camels in winter 2005 (*for a summary see report by Walzer and Kaczensky 2005*). However, given the need for good data to promote wild camel conservation an additional three collars had been purchased by the UNDP / GEF project.

This summer's work was conducted within the framework of the two projects mentioned above. The specific aims of this summer's trip were:

- collar 5-7 Asiatic Wild Ass with GPS / ARGOS collars
- collar 3-5 Wild Camels with GPS / ARGOS collars
- count Asiatic Wild Ass and Wild Bactrian Camels along our travel route
- collect camel hair samples for genetic workup

2. Time table & route

2.1. Timing

The field trip for Khulan and wild camel collaring in the Great Gobi A SPA was conducted between 20 May and 6 June 2007 (Table 1). The team covered ~1850 km within the Great Gobi A SPA (Fig. 2).

Table 1: Travel dates and route of the Khulan / Wild Camel expedition in May/June 2007.

Date	Location	Task
20 May	Camp 1	At container 1
21 May	Camp 2	Near Jingyn Us
22 May	Camp 3	Near Jingyn Us
23 May	Camp 4	Near Bogts Tsagaan Ders
24 May	Camp 6	On the dry plain in the west
25 May	Camp 7	At Baruun Tooroin Bulag (Fig. 1)
26 May	Camp 8	Near Bogts Tsagaan Ders
27 May	Camp 9	Near Baruun Sharga
28 May	Camp 10	At Baruun Sharga
29 May	Camp 11	At Baruun Sharga
30 May	Camp 12	On the dry plain in the east
31 May	Camp 13	Near Jingyn Us
1 June	Camp 14	Near Myangan Tooroi Bulag
2 June	Camp 15	East of Gants Serven
3 June	Camp 16	At Canyon water point
4 June	Camp 17	At Canyon water point
5 June	Camp 18	At Bore Us
6 June	Bayantooroi	back to park headquarter

Fig. 1: Baruun Tooroi Bulag.

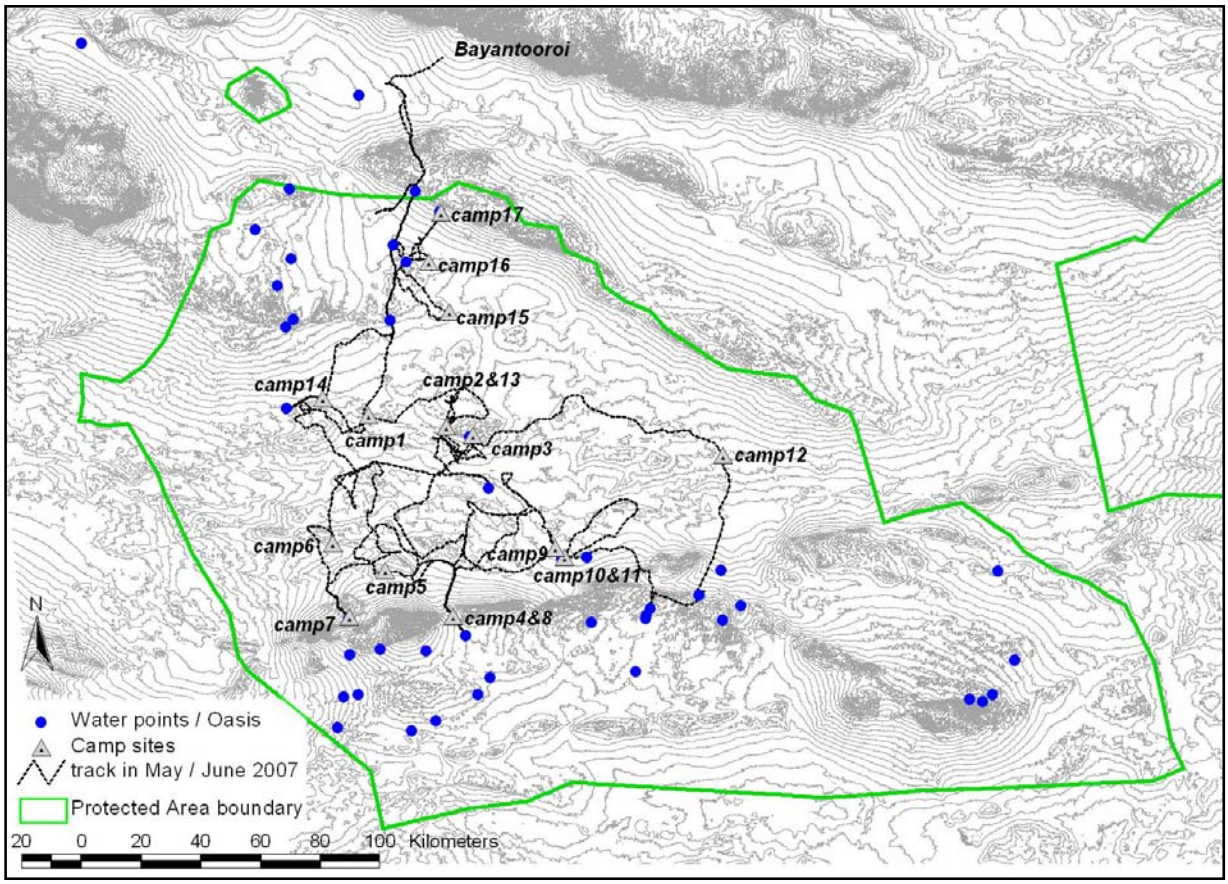

Fig. 2: Route in the Great Gobi A SPA from 20 May until 6 June 2006.

2.2. The field team

The field team consisted of 8 participants (Fig. 3):

National:

- Adiya Yadamsuren; Camel Researcher, Institute of Biology Mongolian Academy of Sciences
- Nyambayar Yanjin; Researcher, Great Gobi A Strictly Protected Area
- Tseveenpurev Baavgai; Student (perceptorship), Agricultural University of Mongolia
- Davaa-Ochir Avirmed; Driver Great Gobi A Strictly Protected Area
- G. Enkhbold; Driver Great Gobi A Strictly Protected Area
- A. Gerelmaa; Cook and Camp Assistant, Great Gobi A Strictly Protected Area

International:

- Chris Walzer; Zoo and Wildlife Veterinarian, Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna, Austria
- Petra Kaczensky; Wildlife Biologist, Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna, Austria

Fig. 3: The field crew. From left to right standing: Tseveenpurev, Chris, Adyia, Nyambayar, sitting: Davaa-Ochir, Petra, Gerelmaa and Enkhbold.

3. Khulan and Wild camel capture, anesthesia and collaring

3.1. Khulans

We were able to capture and collar four khulans on this trip (Table 2). For all animal we employed a chase method where the khulan is darted from a moving jeep (Walzer and Kaczensky 2004; Walzer et al. 2007). Thanks to the excellent driver and the good condition of the UAZ jeep, chasing was possible even in the saxaul steppe. During chases speeds of up to 70 km/hour were reached! The chase time was closely monitored and lasted from 7 to 17 minutes. In the one time where our pre-established cut off time of 15 minutes was exceeded, the animal did not run at full speed during the entire chase period.

For remote dart application we used a modified high pressure CO_2 dart gun (Daninject JM™, Wildlife Pharmaceuticals, Fort Collins, CO 80524, USA) with a short 4 cm barrel. The animal was darted at a range of 10-15m with a single 3ml dart (Daninject) containing a combination of 4.4 mg Ethorphine (M99, C-Vet Veterinary Products, Lancs, UK), 10 mg Detomedine-HCl (Domosedan, Orion Corp. Farmos Finland) and 10 mg Buthorphanol (Torbugesic, Fort Dodge Animal Health, Iowa, USA). Anaesthesia was reversed with an intravenous combination of 12 mg Diprenorphine (M5050 Revivon, C-Vet Veterinary Products, Lancs, UK). Handling lasted between 5-15 minutes and all animals recovered fully and without any problems from the anesthesia (Fig. 4).

Fig. 4: Khulan #4 leaving after 5 minutes of handling.

3.2. Wild Camels

Contrary to khulans, camels again proved to be rather easy to capture from a moving jeep. Whereas khulans reach up to 65 km/h, camels merely run at 35 km/h and can basically be chased in any type of habitat. We used the same technique and a similar drug combination for wild camels as for khulans (Walzer and Kaczensky 2006; Walzer et al. 2006). However, anaesthetized wild camels show a retro-flexion of the neck and to allow snug collar placement the head should be stretched, as otherwise the collar will end up too loose.

In five of six camels darted, anaesthesia and subsequent recovery went smooth and without complications (Fig. 5). However, the first wild camel, an old bull (>15 years) died as a consequence of the capture event. This bull was easily darted as he ran much slower than the other animals in his group. Furthermore, it took a full 40 minutes after darting to reach the bull. The animal was in respiratory arrest when approached. Immediately 250 mg naltrexone (IV) was administered and the animal resumed breathing. However the animal arrested again after 10 minutes. A full necropsy was unfortunately not possible and so the cause of death is undetermined. We speculate that this animal possibly had a pre-existing medical condition that was also responsible for the very slow pacing. Additionally in this animal a massive retro-flexion of the neck – a typical side effect of the potent opiate ethorphine in camelids – was noted. As the animal was only reached after 40 minutes it can not be excluded that it aspirated gastro-intestinal content, which lead to its death.

Fig. 5: Wild camel darted (left) and just recovered from anesthesia (right).

4. Collar specifications

4.1. GPS / ARGOS collars

Given the past problems encountered with ARGOS collars in central Asia (see report by Kaczensky and Walzer 2006), all animals (khulans and wild camels) were collared with adapted GPS / ARGOS collars (TGW-3580, Telonics, Mesa, USA; Table 2). In seven collars the output power was increased from 0.5 Watt to 1 Watt and in two collars (1 khulan, 1 wild camel) the antenna design was changed, while leaving the output power at 0.5 Watt. Contrary to the old antenna design which runs within the collar material, the new antenna extends freely, allowing for a stronger signal output (Fig. 6). However, we were hesitant to use the new antenna design on more than two collars as we are unsure how sturdy this new design will prove. Past experience has shown that especially khulans are very hard on collars due to frequent fighting which involves kicking and biting. Once the antenna breaks off, no ARGOS uplink is possible any more - making collar retrieval impossible.

Fig. 6: new antenna design on Telonics TGW-3580 collar.

The collars were programmed as following:

(1) Old antenna, 1 Watt output power (3 khulans, 4 wild camels):

- attempts 1 GPS location every 11 hours
- 1 May 2007 – 31 May: transmits GPS data via ARGOS uplink every day (*test mode*)
- 1 June 2007 – 19 December 2008: transmits GPS data via ARGOS uplink on 2 consecutive days each month (*data collection and collar check mode*)
- 20 December 2008 – end of battery: transmits GPS data via ARGOS uplink every 2. day (*collar retrieval mode*)
- Additional possibility for ARGOS locations due to a shortened repetition rate of 93s instead of 200s.

With this schedule, the collars basically work as store on board units and just use the ARGOS satellite system to allow collar retrieval. With the present set-up the collars are expected to last for ≥19 months. For animal welfare reasons and to allow collar retrieval, the collars are equipped with a pre-programmed drop-off device (CR-2A, Telonis, Mesa, USA), which will release the collars on 20 December 2008.

(2) New antenna, 0.5 Watt output power (1 khulan, 1 wild camel):

- attempts 1 GPS location every 7 hours
- transmits GPS data via ARGOS uplink every 2. day
- Additional possibility for ARGOS locations due to a repetition rate of 93s instead of 200s.

With this schedule, the collar is expected to last for ≥12 months. For animal welfare reasons and to allow collar retrieval, the collars are equipped with a pre-programmed drop-off device (CR-2A, Telonis, Mesa, USA), which will release the collars on 1 June 2008.

Table 2: Capture and collar specifications of the khulan captured in the Great Gobi A SPA.

Date	Time	Sex	Age	Condition	ARGOS ID	Antenna	VHF	Eartag	YCO	XCO	Drop date
Wild camels											
21.05.07	19:52:59	male	>15 years	*not collared - animal died*					43.97884	96.87196	
22.05.07	10:06:59	male	young		70350	new	151.600	30	43.97060	96.88241	01.06.2008
23.05.07	18:03:09	female	young	milk	25915	old	151.450	35	43.52385	96.65010	20.12.2008
25.05.07	11:26:57	male	9-10 years		70348	old	151.300	34	43.62327	96.46976	15.01.2009
25.05.07	16:38:11	female	11-12 years	pregnant	23091	old	150.200	39	43.78904	96.40805	20.12.2008
01.06.07	16:35:37	male	young		25805	old	151.350	26	43.77753	96.86586	20.12.2008
Khulans											
22.05.07	15:46:33	female	young		22366	old	151.900	32	43.78004	96.98557	20.12.2008
25.05.07	10:37:40	male	young		70349	old	151.400	33	43.56116	96.39666	15.01.2009
27.05.07	14:13:43	male	7-8 years		58848	new	151.500	44	43.62034	96.49991	01.06.2008
05.06.07	12:02:19	female	5-7 years		25731	old	151.100	49	44.44896	96.82521	20.12.2008

4.2. Collar testing

Collars were tested according to the Telonics protocol and the initiation process did not produce any error messages.

Seven collars were deployed on captive wild and domestic camels near Bayantooroi by Enkhbileg Dulamtseren, Wild Camel Foundation Mongolia, for testing (Fig. 7). Due to a misunderstanding, collars on the test animals were attached rather loosely - and thus were positioned lower on the long neck than collars would be fixed on their wild counterparts (e.g. see Fig. 4 for comparison).

All collars were in testing mode in May 2007 and we expected 2 GPS locations per day and an ARGOS transmission every day; ideally resulting in 24 locations in the 12 day test period.

Fig. 7: Collar deployed for testing on a domestic camel near Bayantooroi.

All collars managed to send GPS positions via ARGOS uplink. However, performance was highly variable (Table 3 & 4). For unknown reasons two collars performed rather poorly and in the end were not deployed on wild camels or khulans.

Table 3: Overview of GPS positions transmitted via the ARGOS satellite system from 7 collars (all with the old antenna design) on captive camels between 5-16 May 2007.

ID	N GPS locations transmitted	N days with uplink	Average diff between locations	Deployed on wild camel or khulan
22366	24	12	11:28	Yes
23091	26	12	10:33	Yes
25731	9	7	19:15	Yes
25778	3	3	22:00	No
25805	10	6	21:59	Yes
25806	7	4	20:00	No
25915	21	12	13:11	Yes
Total	***100***			

Table 4: GPS positions transmitted via the ARGOS satellite system from 7 collars (all with the old antenna design) on captive camels between 5-16 May 2007 by day and collar.

GPS date	N GPS locations transmitted via ARGOS uplink per ID and day							Total
	22366	23091	25731	25778	25805	25806	25915	
05.05.2007	2	3		1		2	2	10
06.05.2007	1	2		1	1		1	6
07.05.2007	3	3		1	2		1	10
08.05.2007	2	2					2	6
09.05.2007	2	2	1				2	7
10.05.2007	2	2	2				1	7
11.05.2007	2	2	1		1		2	8
12.05.2007	2	2	1		1		2	8
13.05.2007	3	3			3		3	12
14.05.2007	2	2	2		2	2	2	12
15.05.2007	2	2	1			2	2	9
16.05.2007	1	1	1			1	1	5
Total	***24***	***26***	***9***	***3***	***10***	***7***	***21***	***100***

Collars 70348, 70349, 70350 and 58848 were not ready early enough from Telonics to allow a testing period on live animals. However, we initialized all four collars upon arrival in Ulaanbaatar and left them running throughout the trip (Fig. 8). From all four collars we received GPS positions via ARGOS uplink prior to deployment on khulans and camels.

Fig. 8: Collars 70348, 70349 and 58848 deployed around camp for testing.

4. First locational data

Khulans
Three of the four khulans were captured during the test mode duty cycle. Khulan #22366 produced 14 locations between 22 and 31 May and already covered a distance of 139 km (distance summed over all consecutive locations). Khulan #70349 produced 5 locations between 24 and 31 May and covered 123 km. Khulan #58848 has a new antenna and produced 27 locations between 27 May and 6 June, covering over 405 km. Khulan #25731 was captured in June and will only transmit data on two consecutive days each month (Fig. 10).

Wild camels
Four of the five wild camels were captured during the test mode duty cycle. Camel #23091 produced 7 locations between 25 and 31 May and covered 128 km. Camel #70348 produced 5 locations between 5 and 31 May, covering about 63 km. Camel #25915 produced 19 locations between 13 May and 1 June and covered over 144 km. Camel #70350 has a new antenna and produced 50 locations between 22 and 5 June and already covered a distance of 391 km. Camel #25805 was captured in June and will only transmit data on two consecutive days each months (Fig. 11).

Two collared camels, female #25915 and one bull camel (the sighting was after 20:00 when the VHF signal is shut down to safe battery power), were re-sighted by chance several days after the initial capture. The female had re-united with the female group with foals and the male was with two other wild camels.

Fig. 9: Khulan and wild camel habitat in the Great Gobi A SPA.

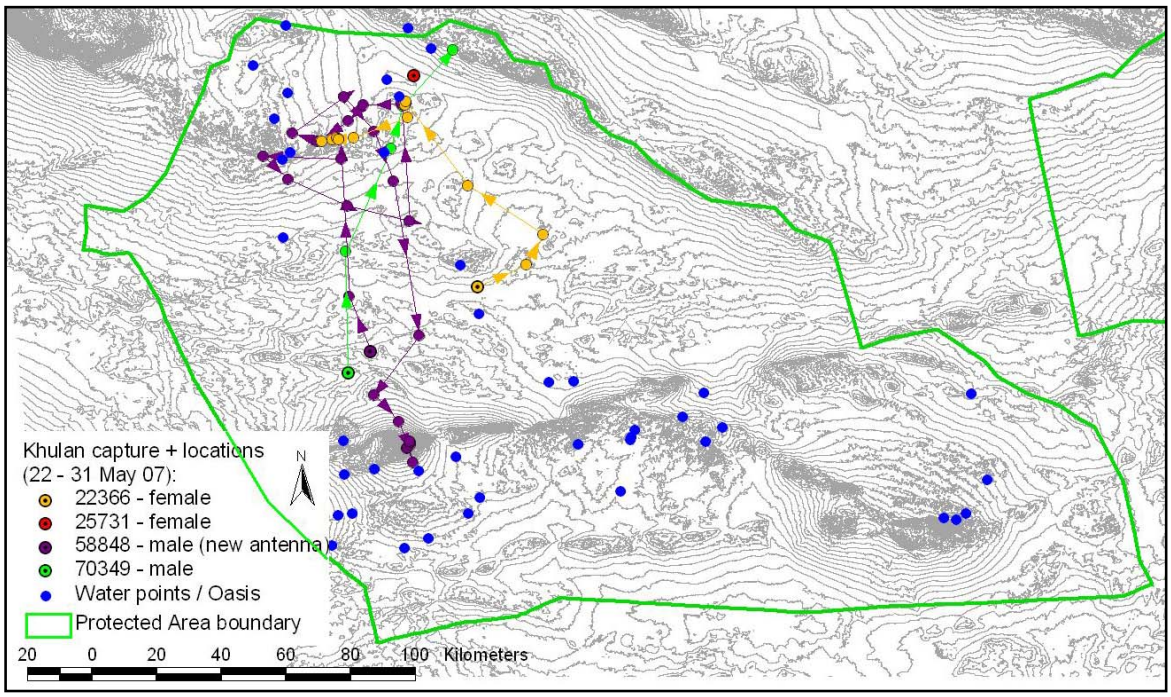

Fig. 10: First GPS locations of 4 khulans captured in the Great Gobi A between 22 May and 5 June 2007.

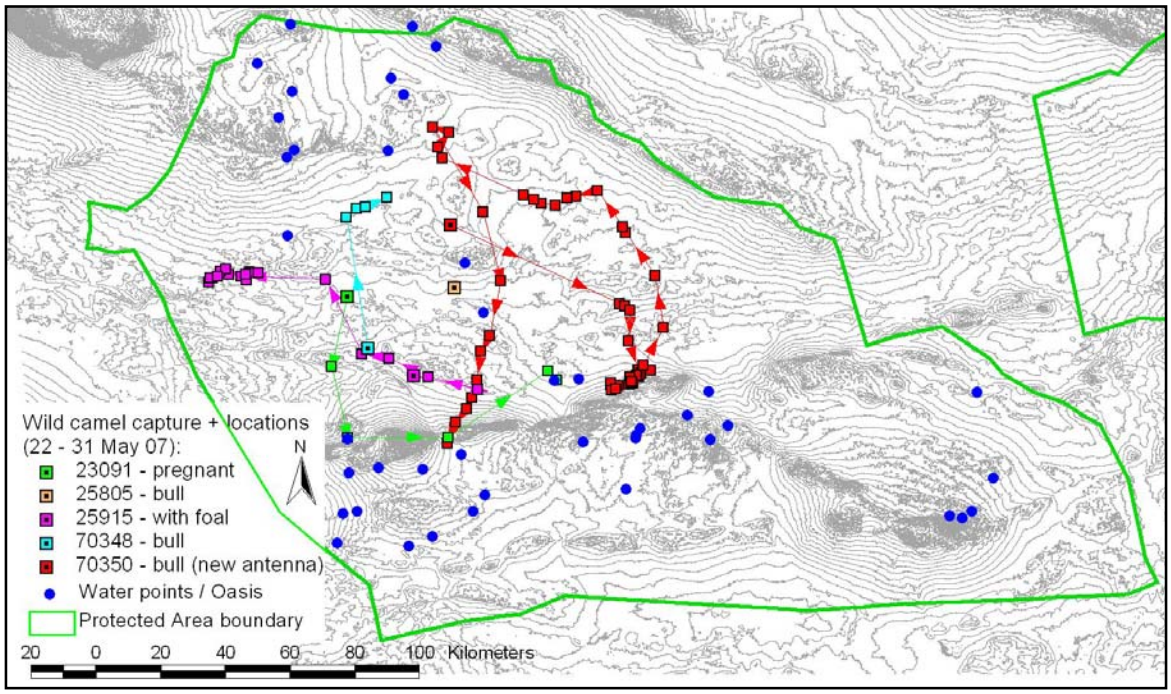

Fig. 11: First GPS locations of 5 wild camels captured in the Great Gobi A between 12 May and 1 June 2007.

5. Ungulate counts

During the 18-day trip through the Great Gobi A SPA we counted 31 khulans in 11 groups/locations, 58 gazelles in 33 groups/locations and 146 wild camels in 24 groups/locations (Fig. 12).

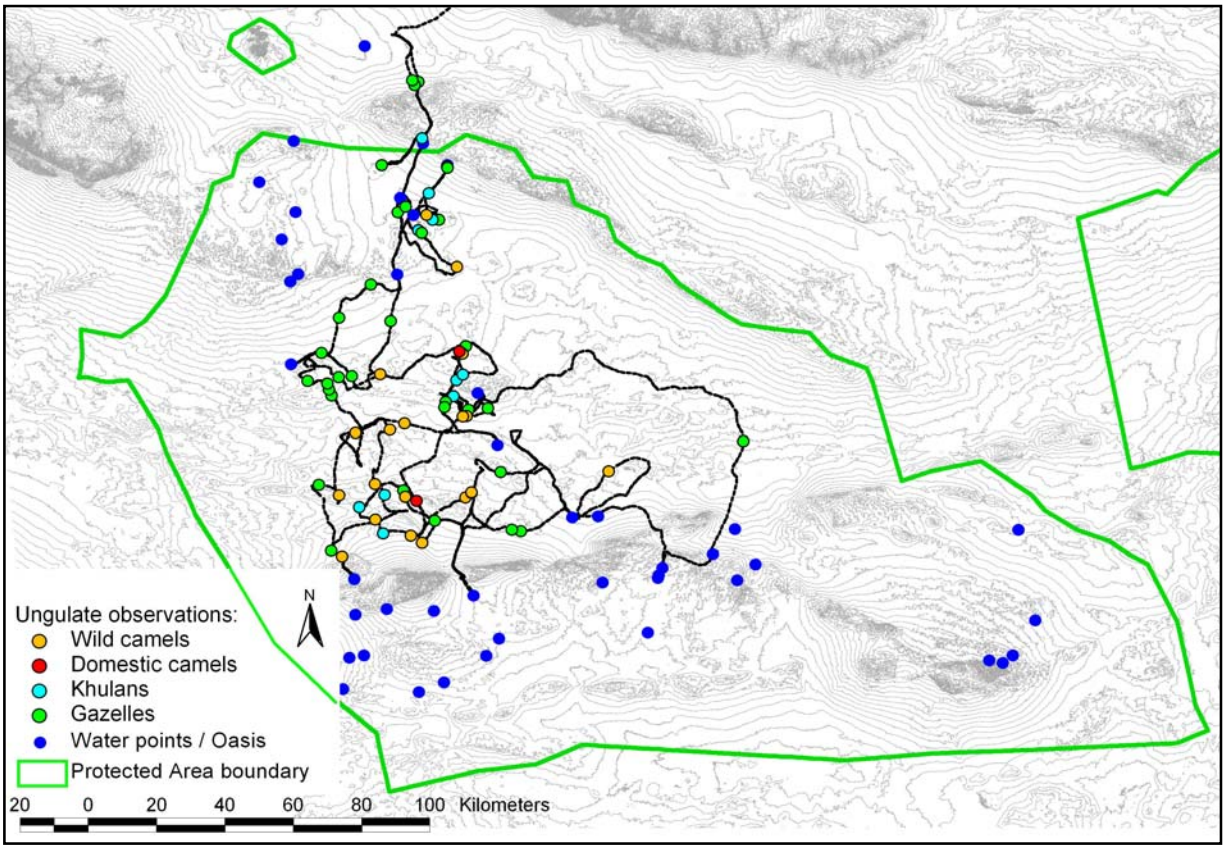

Fig. 12: Ungulate sightings along the track in the Great Gobi A SPA between 20 May and 6 June 2007.

In addition, we saw three domestic camels with the wild camels on three occasions: one with a wooden stake in the nose in a group of ~8 camels, one in a group of three camels and one female with what looked like a hybrid foal in a group of 12 camels with 3 wild foals (Fig. 12).

Fig. 12a: Domestic camel within group of ~8 wild camels on 21 May 2007.

Fig. 12b: Domestic mare within a group of females with foals on 25 May 2007. Her hybrid foal was very light colored, slower and got separated from the group. Three wild foals stayed with the domestic mare.

Fig. 12c: Domestic camel within group of two wild camels on 1 June 2007.

6. Update on genetic research

The extent of the genetic distinctiveness between the wild and the domestic Bactrian camel is still unknown. Following the initial wild camel collaring mission in 2005 (*see report by Walzer and Kaczensky 2005)*, Katja Sibermayr was recruited at the university of veterinary medicine in Vienna to initiate under the tutelage of Dr. Pamela Burger (Institute of Animal Breeding and Genetics) an initial investigation of the Bactrian camel mitochondrial DNA.

The aim of this study was to genetically characterize and differentiate the wild Bactrian camel from its domesticated form and to back up the existing conservation actions for this endangered species. The focus was on the control region of the mitochondrial DNA, a marker preferably applied within the field of population genetics. A 367 nucleotide long sequence of the mitochondrial control region was amplified and single nucleotide polymorphisms (SNPs) of the mitochondrial control region were analysed.

For the analysis of the genetic relation between the populations, blood and hair samples from a total of 40 individual wild and domestic Bactrian camels were analysed. Out of 45 analysed sequences from wild-, domestic-, and hybrid camels, 14 haplotypes were differentiated. Results further revealed nine polymorphic loci and one fixed mutation between the wild and the domestic Bactrian camel populations. This transition is located on position 310 (15619 of the Lama reference sequence, Gene Bank Nr: AJ566364; ARNASON et al., 2004) of the 367 nucleotide long fragment.

The results of the mitochondrial haplotyping were used for the creation of phylogenetic trees with the algorithms neighbour joining, maximum parsimony and maximum likelihood. The genetic differentiation of the two populations (wild and domestic Bactrian camel) is obvious in the phylogenetic analysis and will serve as a basis for future phylogenetic studies on the relationship between the wild and domesticated Bactrian camel (Sibermayr et al. 2006; Sibermayr et al. in prep.).

7. Other rare wildlife

Gobi bears

We saw one unmarked gobi bear at Bogts tsagaan ders waterpoint on 24 May around 12:00. In addition, we picked up the signals of two radiocollared bears (VHF frequencies: 150.520 and 150.760) at Shar Khulsny Bulag water point (Fig. 12). We additionally saw many tracks (not measured) at Baruun Tooroin Bulag and tracks of 11cm and 13 cm (front paw width) at Khoshiityn Dood Us.

Fig. 12: Gobi bear near Bogts tsagaan ders water point.

Others

On 28 May at 12:00 we observed a black stork (*Ciconia nigra*) flying low at GPS position 43.435617 / 96.78810.

8. Conclusions

Science-based conservation efforts in general, often require capture and subsequent handling of the subject animal. Probably, the two most common research reasons that require the capture of animals are the placement of radio-telemetry devices and the collection of biomedical materials (Osofsky & Hirsch 2000). In order to develop management plans for Mongolian wild camels and khulans, which range over vast areas, the use of radio-telemetry is an essential tool. Every anaesthetic event bears the inherent risk of significant injury and potentially death. Though this risk is for the most part extremely small it must be ascertained that the procedure is necessary and that the potential gains outweigh the risks (Kreeger et al. 2002). We strongly believe that the gains from this collaring mission far outweigh the very unfortunate loss of a wild camel. Furthermore, we confidently recommend the described capture methods and anaesthetic protocols used to date in this project.

Due to the fact that we once again saw domestic camels within wild camel groups inside the protected area we wish to strongly reiterate our previous recommendations concerning the risk of hybridization (*see report by Walzer and Kaczensky 2005):*

- Develop a concise written policy on the identification and management of hybrid camels
- Remove hybrid and domestic camel encountered in the park
- Limiting breeding possibilities for hybrid camels held with livestock in the buffer zone (e.g. castration, hormonal implants for females)
- Limiting / preventing the movement of hybrid and domestic camels into the park (winter camps!)
- Establish a hybrid camel inventory
- So long as domestic and hybrid camels can enter the SPA we strongly suggest these be marked with ear tags. Furthermore, holders should be requested to notify the SPA if the status of an animal changes (e.g. escape to the wild).

9. Acknowledgements

We are especially grateful to our tireless field team. Mr Nyambayar, Mr. Tseveenpurev for their never ending support at camp and looking out for khulans and camels. Davaa for his incredible driving which first made the captures possible. Boldoo for pushing his UAZ-furgon to new limits and getting us a further khulan. Gerelmaa was once again the heart and soul of the camp, with almost no food left, she made sure we didn't go hungry. As in the past we are especially grateful for the overall good humour and fun in the face of daily adversity and bad luck which really made this trip a success. Many thanks also to Great Gobi A SPA staff in Bayantooroi for their hospitality and motivation. We would like to thank UNDP staff, namely Mrs Narantuya and Mr. Bayasgalan for organisational help.

This mission was dedicated to the memory of Gobi A ranger Mr. Choijin - a true Gobi man.

Mr. Choijin 1937 - 2007

10. Literature cited

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