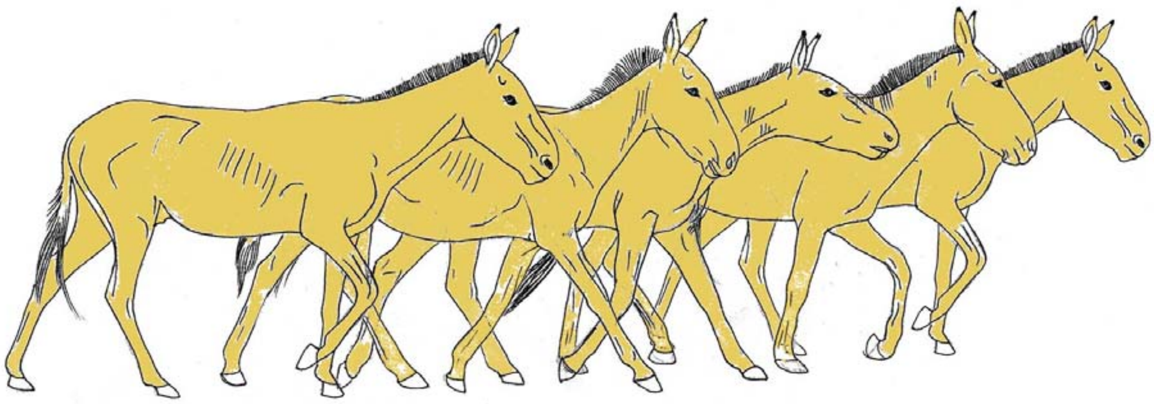
Landscape level research for the conservation of Asiatic wild ass in Mongolia

Reports November 2006



Research Institute of Wildlife Ecology
University of Veterinary Medicine
Savoyen Strasse 1, A-1160 Vienna, Austria

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Attempt of an aerial survey for Khulan in the SE Gobi

Petra Kaczensky

November 2006

Pallas' Sandgrouse ***Photo: Petra Kaczensky***

Within the framework of:

"Impacts of Well Rehabilitation and Human Intrusion on Khulan (Wild Ass) and Other Threatened Species in the Gobi Desert" funded by the World Bank's Netherlands-Mongolia Trust Fund for Environmental Reform
&
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I. 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 present, the status and trend of the khulan population in Mongolia is difficult to assess, as no standardized monitoring has been installed. The most recent population estimates for Mongolia date from 1994-1997 and 2003, respectively. The 1994-1997 survey estimated 33.000 - 63.000 khulan over a continuous distribution range encompassing entire southern Mongolia (Reading et al. 2001), whereas the survey in 2003 estimated 19.652 ± 600 animals over an area of 177.563 km^2 in southern Mongolia (Mongolian Ministry of Nature and Environment 2003), suggesting a decline in khulan numbers over the last 9 years.

However, population estimates should be treated with caution because reliable estimates are hindered by the large size and remoteness of the distribution range, the lack of proven ground survey protocols, the marked seasonal movements, a locally clumped occurrence and the large variation in possible group sizes (Buckland et al. 2001, Kaczensky and Walzer 2002b-2003b, Kaczensky et al. 2006). A preliminary analysis of 21 surveys, following a DISTANCE sampling approach (http://www.ruwpa.st-and.ac.uk/distance/), of the eastern part of the Great Gobi B SPA (2,500 km^2) and 6 surveys of the entire GG B SPA (9,000 km^2) show that single ground surveys are practically useless for tracking population trends, due to extremely large 95% confidence intervals (Kaczensky unpubl. Data). In addition, the large flight distances of khulans violate the conventional assumptions for DISTANCE and do not allow for a precise measure of perpendicular distances. In past surveys, researchers often used observer distances instead of the required perpendicular distances (B. Lhagvasuren pers. comm.), which tends to overestimate the effective transect width.

For the conditions in the Gobi, aerial surveys would be the preferred method. So far, no suitable fixed winged aircrafts were available in Mongolia. In addition, the import of foreign aircrafts is strongly discouraged and landing outside of regular airports is prohibited. In September 2006 we learnt about a new aviation company, called “Air Future” (http://www.afmmgl.com) which owns two small airplanes, a two seat Jabiro J230 and a four seat Jabiro J230. Both planes are highly suitable to conduct an aerial. We made arrangements to book the Jabiro J230 for a two week period (10-23 November 2006) to conduct a pilot survey in the SE gobi.

Upon arrival in Mongolia the aerial survey was cancelled due to safety concerns, unprofessional behaviour on the side of Air Future and organizational problems. The following reports gives a detailed account on the planning stage and the reasons for the failure to conduct the survey.

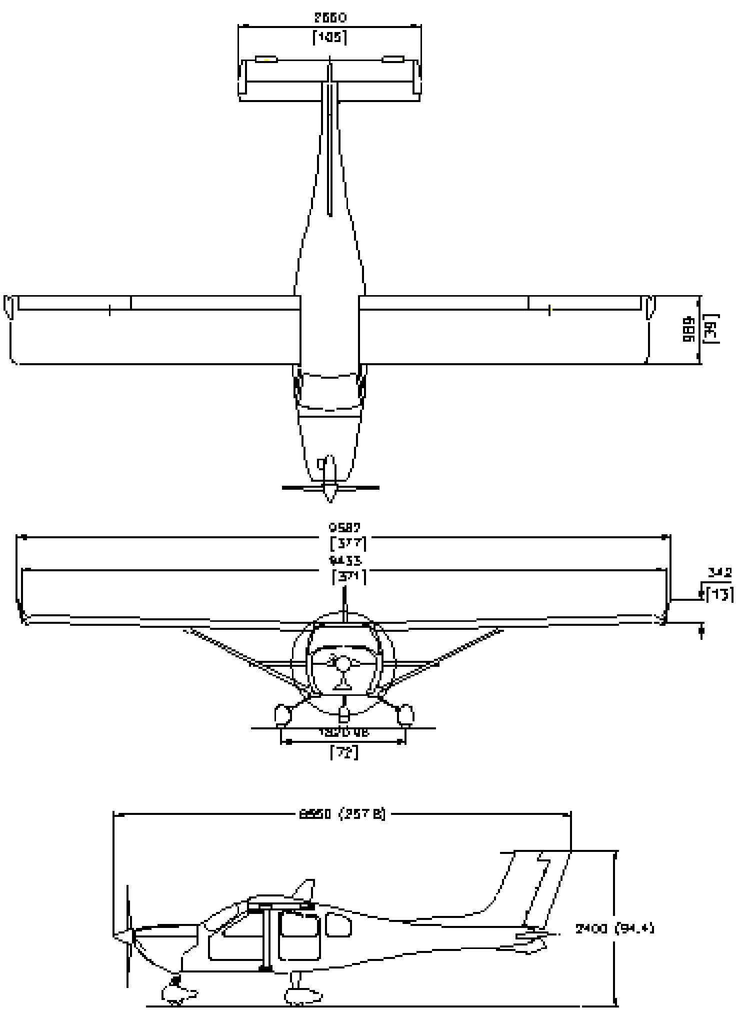
II. Planning of the aerial survey

The plane (copied from: http://www.jabiru.net.au)

The Jabiru J230 (2 seats) and the Jabiru J430 (4 seats) aircraft have been developed as touring aircraft. They have a wide cockpit, high cabin and ample leg room. The Jabiru J230 has a big baggage compartment in the back whereas the Jabiru J430 has 2 rear seats. They have the same fuselage and have the standard LSA wing with winglets. The fuel is in the wings. The longer tail boom results in more elevator and empennage authority (power of the elevator), reducing the stall speed to 45 kts and increasing directional stability. The J430 was developed as a great alternative to GA aircraft such as the Cessna 172. The Jabiru J230/430 cruises at 120 knots on 20 litres/hour.

Jabiru J230/J430 Specifications

Aircraft Type	**J230 and J430**
Engine	Jabiru 3300cc
	120hp
	6 cylinder, 4 stroke
Propeller	2 Blade Fixed Pitch
	Wooden/Composite
	60"dia x 53" pitch
Height	2400 mm (24.4")
Length	6550 mm (257.8")
Width Tailplane	2660 mm (104.7")
Cabin Width	1120 mm (44.09")
Cabin Height	1090 mm (42.9")
Wing Span	9433 mm (30.9')
Wing Area	9.34 sqm 100.5sq.ft)
Wing Loading Gross (544kg)	11.92 lbs/sq.ft
Wing Loading Gross (700kg)	15.3 lbs/sq.ft
Aspect Ratio	9.5



Speeds	
Va (Max. Maneuver)	115 kts (132 mph)
Max Cruise	120 kts (138 mph)
Max. Straight & Level	135 kts (155 mph)
Stall speeds at 544kg	
Vso (full flap)	39 kts (45 mph)
Vs1 (clean)	44 kts (51 mph)
Stall speeds at 700kg	
Vso (full flap)	45kts (52 mph)
Vs1 ((clean)	50 kts (57 mph)
Climb Rate (at sea level) 544kg	1000 ft/min
Climb Rate (at sea level) 700kg	700 ft/min
Service Ceiling	15,000 ft
Empty Weight	340 kg (748 lbs)
Gross Weight	544 kg (1197 lbs)
Useable Load	204 kg (449 lbs)
Gross Weight	700 kg (1540lbs)
Useable Load	360 kg (792 lbs)
Structural Loading Flight	
Load Factor	+ 3.8 – 1.9 G
Applied Loads 54degC (129.2degF)	+6.8G -3.4G
Fuel Capacity (Usable)	135 lts
Range (Nil Reserve)	800 nm
Endurance (Nil Reserve)	6.7 hrs
Fuel Consumption at Cruise	20 lts/hr (6 USgal)
Glide Ratio	12:1
Crosswind Component	14 kts

Take Off Distance at 544kg (Ground-roll)	100 m (328 ft)
Landing Distance at 544kg (Ground-roll)	180 m (656 ft)
Take Off Distance at 700kg (Ground-roll)	150 m (492 ft)
Landing Distance at 700kg (Ground-roll)	220 m (820 ft)

Disclaimer

All specifications are quoted for a standard aeroplane with wheel spats and one standard occupant (unless stated).The product specifications and details are generally descriptive of the product shown and were correct at the time of printing. In accordance with our policy of continued product improvement, we reserve the right to vary the specifications and details at any time.

The team

The survey team was planned to consist of 5 researchers (3 international trainers, 2 national trainees) and the pilot:

National:
- Adiya Yadamsuren; Camel researcher, Institute of Biology Mongolian Academy of Sciences
- Davaa Lkhagvasuren; Small mammal researcher; Department of Zoology, Faculty of Biology, National University of Mongolia

International:
- Robert Hayes; Wildlife Biologist; Haines Junction, Yukon, Canada
- Ulrich Wotschikowsky; Wildlife Biologist; VAUNA, Oberammergau, Germany
- Petra Kaczensky; Wildlife Biologist, Research Institute of Wildlife Ecology, University of Veterinary Medicine, Vienna, Austria c/o Department of Wildlife Ecology and Management, University of Freiburg, Germany

The survey area

Originally we aimed to survey the area west of the railway up to Dalanzadgad and from the Chinese-Mongolian border up to Sainshand using parallel transects spaced 20 to 40 km apart (Fig. 1).

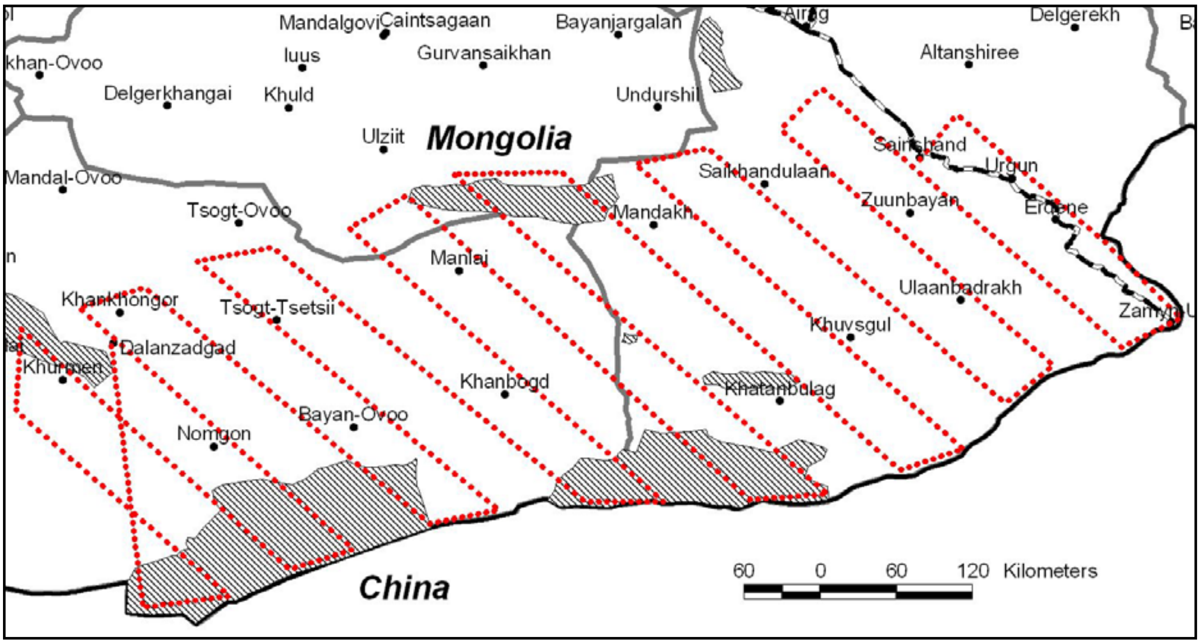


Fig. 1: Draft outline of the aerial survey provided for initial planning to the aviation company Air Future.

Air Future explained that the airport in Sainshand closes down on 1 November and proposed to use the airport at Oyu Tolgoi, owned by Ivanhoe Mines (www.ivanhoe-mines.com/s/OyuTolgoi.asp).

Thus the survey was designed to use a single airport for re-fuelling in the middle of the study area. Based on the maximum range of 600km for the Jiburo J430, the survey area was delineated in a 200 km circle around Oyu Tolgoi. To allow an even coverage of the area, parallel transects were drawn at a distance of 20 km to each other and the area was subdivided (stratified) into 4 blocks for initial survey planning (Fig. 2). With such a design around 10.000 km would have be flown – 5.000 km on the transect lines (on-effort) and 5.000 km travelling back and forth for re-fuelling (off-effort). Assuming an effective strip width of 1 km to the left and right on the transect lines, the area covered would have roughly been 10,000 km², which accounts for 10% of the survey area.

Prior to the actual survey, we had planned to do a 2-day exploration flight flying at high altitude and at fast speed to scan the area for possible areas of high and low khulan distributions. If such areas were detected sampling effort would have been adapted accordingly, that is areas of high khulan densities would have been sampled at higher intensity (shorter distances between parallel transects) and areas of low density at lower intensity (wider distances between parallel transects). Our expectation was that khulans would be more concentrated in the southern half of the study area (block 1 and 2) than in the northern half (block 3 and 4).

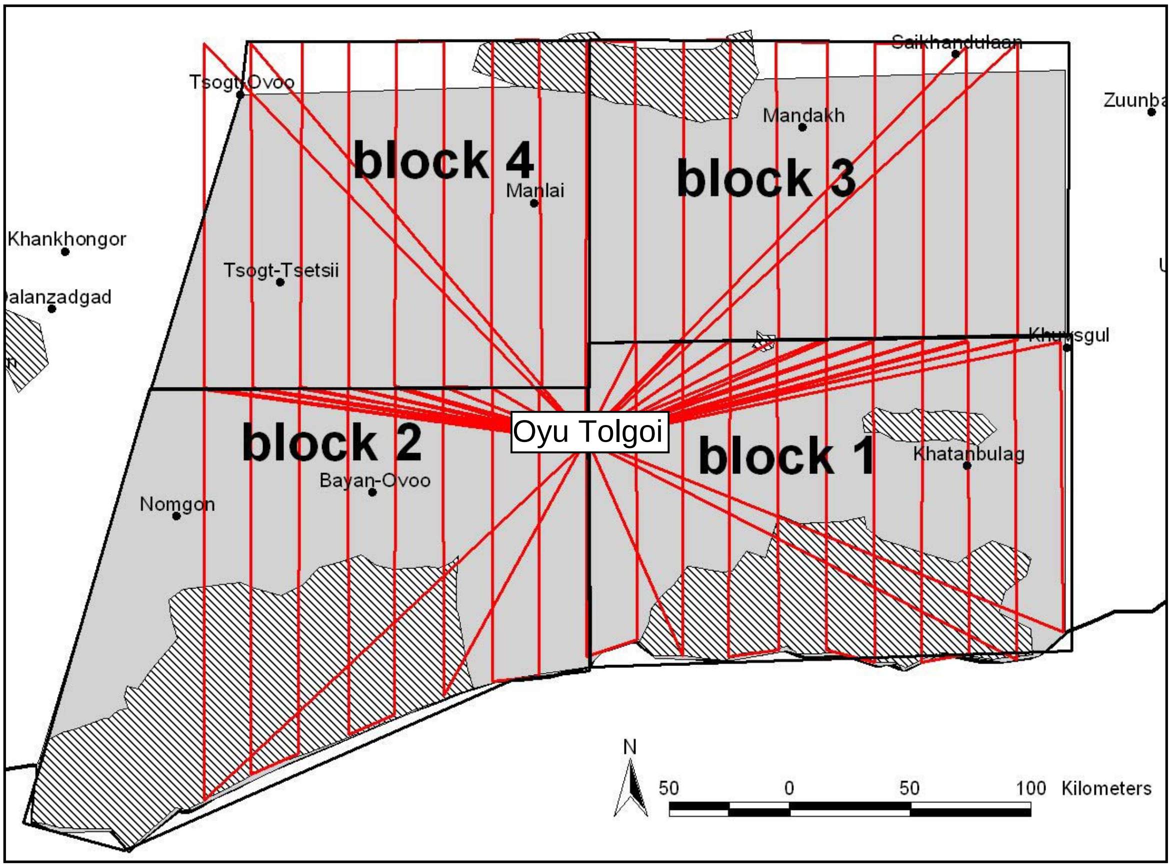


Fig. 2: Draft outline of an even coverage survey design for the whole study area.

General survey design

We had planned to fly at 100-200m above ground with a speed of 100-120 km/hour and use a DISTANCE sampling approach. Wing markers would have been fixed on the airplane struts following methods described by Norton-Griffith (1978, Fig. 3).

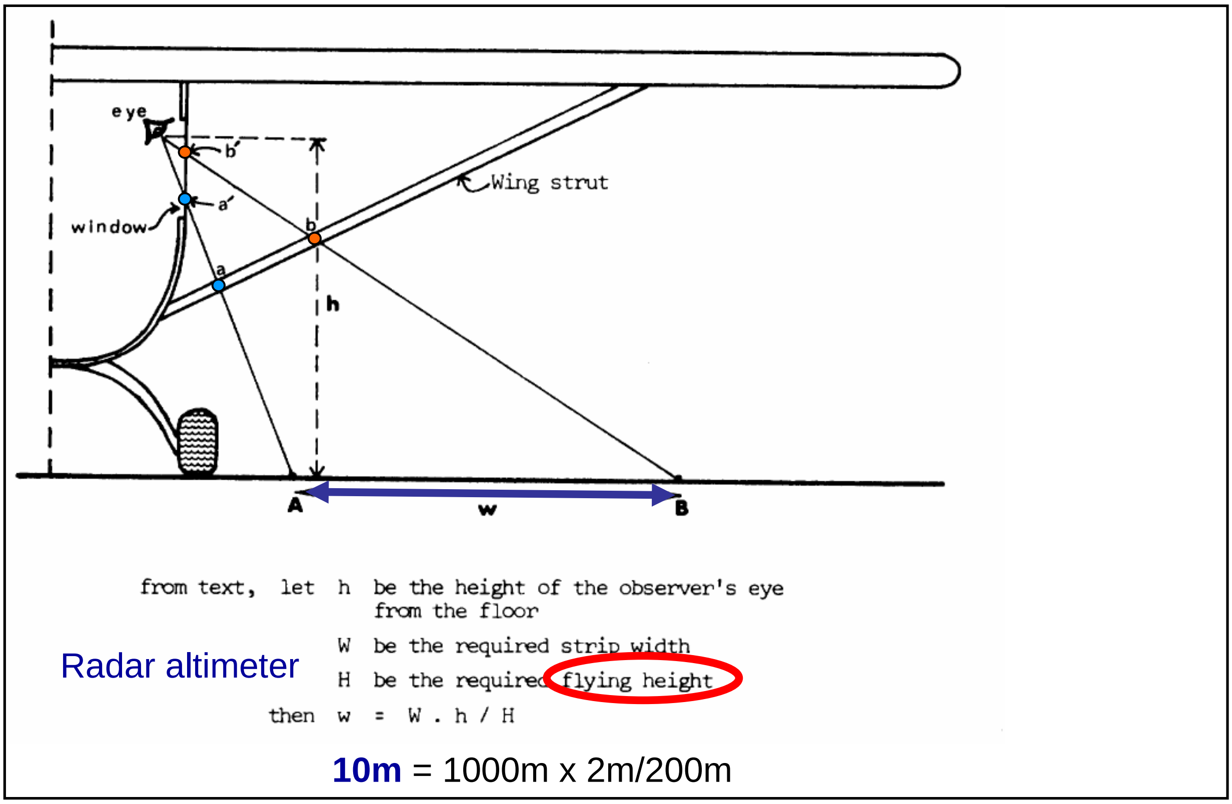


Fig. 3: Wing markers for preliminary distance interval markers. The final calibration is done by flying over evenly spaced distance markers on the ground at the pre-defined flying height (to be determined on the 2-day exploration flight. In the above example a flying height of 200m was assumed).

Although Air Future had claimed to be able to measure elevation off ground by the aviation GPS, in the end it turned out that the GPS on board can only measure the elevation above sea level. Using the GPS track-log and a digital elevation model (DEM) of the study area it would have been possible to re-calculate the effective strip width, but this would have made a DISTANCE sampling approach very difficult as the effective strip width varies with distance above ground (see Fig. 4).

Ideally an airplane is equipped with a radar altimeter. In our case the alternative would have been to calculate the required flying height above see level based on a constant flying height above the DEM (e.g. at 2 km intervals along the pre-defined transect routes).

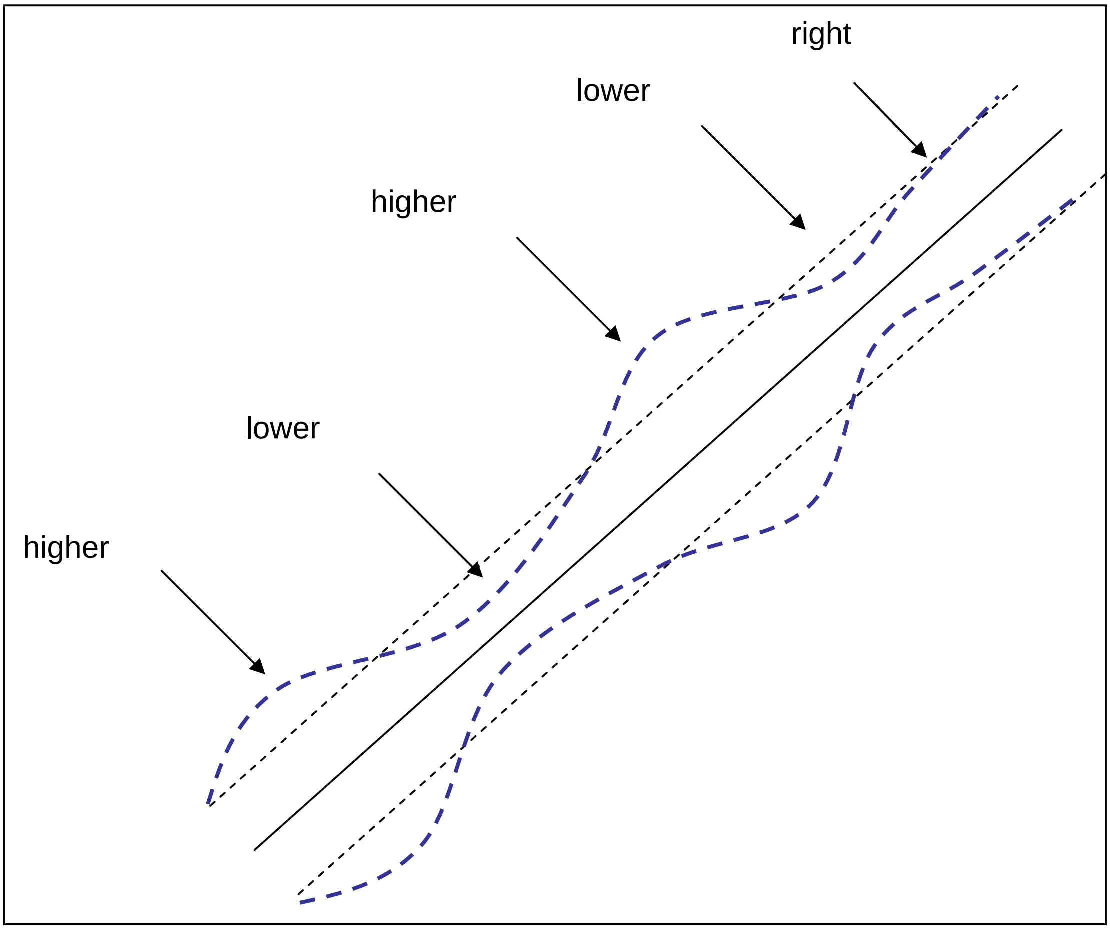


Fig. 4: Impact of variable flying height on the effective transect width.

Additional equipment

The additional survey equipment consisted of:

- 3 digital voice recorder for data recording
- 3 GPS units for data location recording and track log recording
- digital camera with 18-70mm lens (NIKON 70s)
- digital video camera (camcorder)
- webcam to be mounted on the bottom of the airplane to survey the transect line
- 2 laptops for data recording (webcam) and/or navigation and data storage
- GIS layer for the survey area (DEM, villages, water points, railway)
- data sheets and data input mask for EXCEL
- topographic maps 1:500.000
- 2 satellite phones
- emergency equipment in case of unexpected landing in the field (tent, sleeping bags, first aid kit, thermos, day ration of high energy food)

Training

Prior to the survey an intensive training session was planned which consisted of:

- 90 min PowerPoint presentation on theoretical and practical aspects of transect sampling techniques with a special focus on aerial sampling
- 2 day training on data recording and data input monitoring domestic animals on ground surveys around Oyu Tolgoi
- initial flights with 3 observers, 2 international trainers and 1 national trainee
- comparison of data between the two observers on the same side of the airplane
- standardized photo documentation (Norton-Griffith 1978) of all Khulan groups >20 and counting of exact Khulan numbers in the evening to gain experience on group size estimates
- common data analysis over the winter 2006/2007
- discussion of results in spring 2007 and subsequent publication in the Mongolian Journal of Biological Sciences

In addition, all members of the survey team were equipped with a digital copy of Buckland et al. 2001, Norton-Griffith 1978 and Craig *unknown date*.

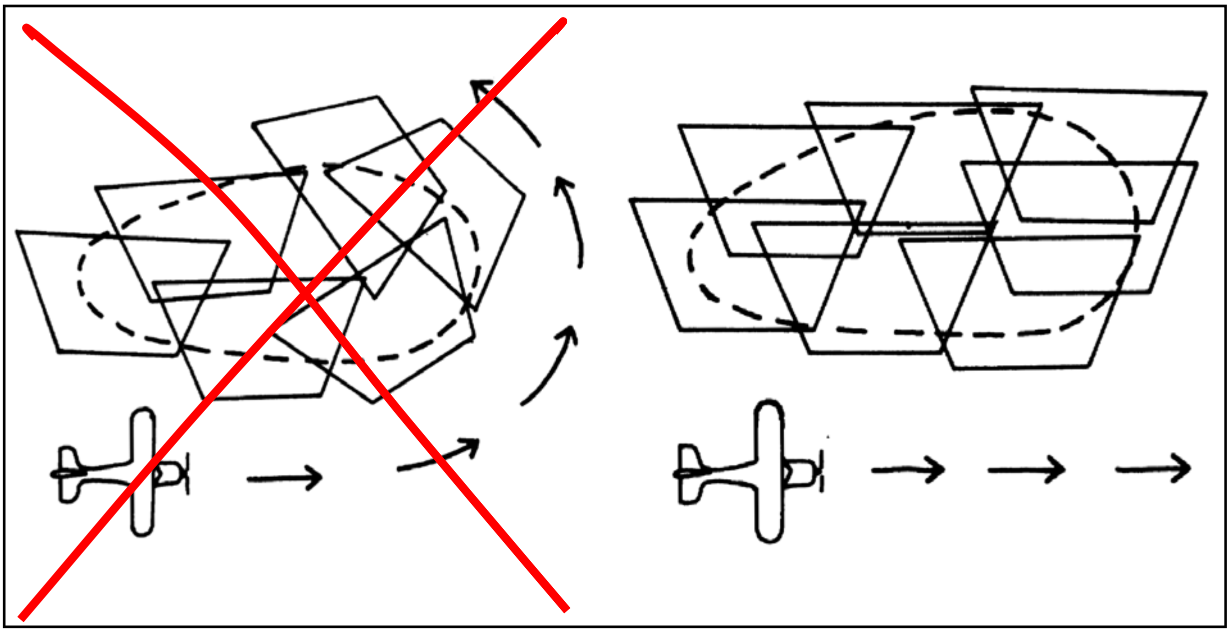


Fig. 5: Standardized photo documentation of Khulan groups >20 animals (from Norton-Griffith 1978).

Collar retrieval

The 2-day exploration flight would have additionally served to locate 5 shed GPS/ARGOS collars via VHF telemetry. In July 2005 seven khulans had been collared in the SE Gobi (see Kaczensky et al. 2006). All collars were equipped with VHF units and drop-off devices programmed to open on 20 October 2006. Collared animals roamed over an area in excess of 92,000 km² and the average range of the VHF signal in the flat steppe is only about 5 km. Thus attempting to locate the VHF signal on the ground is like searching for the proverbial needle in the haystack.

Of the seven collars deployed, one stopped working after 3 weeks and the animal was assumed to have been poached. The other collars transmitted data at irregular intervals until May 2006, when the last collar prematurely stopped transmitting data (Kaczensky et al. 2006). One animal died in June 2006 and with the disintegration of the animal's body the collar was able to reach the ARGOS satellite system again. It was retrieved in July by Davaa Lkhagvasuren (NUM) and send to Telonics for evaluation. Consultation with Telonics, CLS (ARGOS) and other projects using ARGOS collars in Mongolia, suggests that background noise levels ("electro smog") in Asia have risen to a point where the low output power of the standard ARGOS collars (500mW) cannot reach the ARGOS satellites any more (Stanley Tomkiewicz, Telonics, pers. comm. and Bill Woodward, CLS America, pers. comm.).

Upon drop-off of the collars on 20 October, 2 units were able to transmit data to the ARGOS satellites again. However, for unknown reasons 1 collar kept sending the position from 8 August 2006. The other collar send near-realtime data with a fixed position as expected.

III. The reality

Air Future

All initial negotiations with Air Future were made with the president Mr. Aldarmunkh Chanarav via e-mail from Europe and by direct communications through Namtar Enksaikhaan of the International Takhi Group (ITG) office in Ulaanbaatar. Telephone communication was impossible due to the poor connection between Europe and Mongolia and the limited language skills of Mr Aldarmunkh. A short pre-contract was signed by Air Future prior to our arrival in Ulaanbaatar which outlined the payment and basic procedures and responsibilities. In the e-mail correspondence it was agreed that we would only fly with an experienced pilot. The suggested pilot by Air Future was Mr N. Jamsran with 15,000 hours flying experience in an AÍ-24 and 1,500 hours flying experience in a Jabiru J-430. Upon our arrival in Ulaanbaatar a more detailed contract was to be signed by the two parties.

On the first meeting with Aldarmunkh Chanarav (president & CEO) and Saikhangerel Batjargal (Flight safety manager) of Air Future several discrepancies with the original agreements emerged:

- Suddenly the 40% payment ahead of the survey was not enough any more and Air Future issued doubts that we would pay the rest of the money.
- The initial, non-negotiable agreement that Bob Hayes would be in the seat next to the pilot and do the navigation was questioned. Instead Saikhangerel Batjargal claimed that Aldarmunkh Chanarav needed to be on the seat of the co-pilot to take over from the pilot Mr. N. Jamsran after the start or the latest after 1 or 2 hours. This would have meant that we would actually be piloted by Aldarmunkh Chanarav the co-pilot for most of the time. The flying experience of Aldarmunkh Chanarav was only 50 hours!
- Upon visiting J. Oyusuvd of Ivanhoe Mines we had to learn that Air Future never applied for a permit to use the airstrip nor the hanger at Oyu Tolgoi. Requesting a permit would have taken at least several days. Furthermore the hanger does not belong to Ivanhoe Mines and presently was used as a storage facility for various equipments. It was unclear if the hanger would be available at all.

Safety concerns and the lack of organization by Air Future made me cancel the whole survey on a second meeting with Air Future the following day. Air Future claimed not to be responsible for organizing permits to use the airstrip and/or the hanger.

Our impression was that Air Future wanted to use the flying time of the survey to train Aldarmunkh Chanarav and allow him to accumulate flying time in order to build up capacity. Our needs for the survey were not taken serious and there seemed little interest in the survey itself.

Experience of the company with foreign customers seemed minimal and the language barrier and the negotiations by e-mail probably did not help to achieve a good working relationship.

Commission of Endangered Species

Additional problems emerged the next day when we were told that the ministry of environment would not grant permission to do an aerial survey in the SE Gobi because the Commission of Endangered Species had opposed to the survey. This opposition came as a great surprise and would have been a major blow against our work and khulan conservation in general. However the blow did not hit home as we had already cancelled the survey for the reasons stated above.

Alternative program

Bob Hayes, who was scheduled to arrive on November 10, was able to cancel his flight. Because the rest of the team was already in Mongolia we decided to head for the SE Gobi to:

- check on the positions of the 2 collars that transmitted data
- check on the last position of the collar that stopped transmitting after only 3 weeks in August 2005
- opportunistically listen to the VHF signals of the missing collars from elevated points or in the soum (district) centers
- opportunistically document Khulan numbers and distribution along our travel path

The reduced ground team consisted of Davaa Lkhagvasuren, Petra Kaczensky, Ulrich Wotschikowsky and Sanjaa the minibus driver. Our trip covered 1,612 km from Ulaanbaatar to the SE Gobi and back (Fig. 7).

We were only able to pick up 1 of the missing 5 GPS/ARGOS collars. At the location of the collar that sends the position dated 8 August 2006 we did not find a collar or any signs of khulan presence. At the last location of the khulan whose collar stopped in August 2005 we found the remains of a poached khulan (Fig. 6). The adjacent plain was scattered with additional khulan carcasses, which supports our initial suspicion that this animal was indeed poached and the collar subsequently destroyed.

Fig. 6: Remains of a Khulan at the last location of a collar that stopped transmitting 3 weeks after collaring in August 2005.

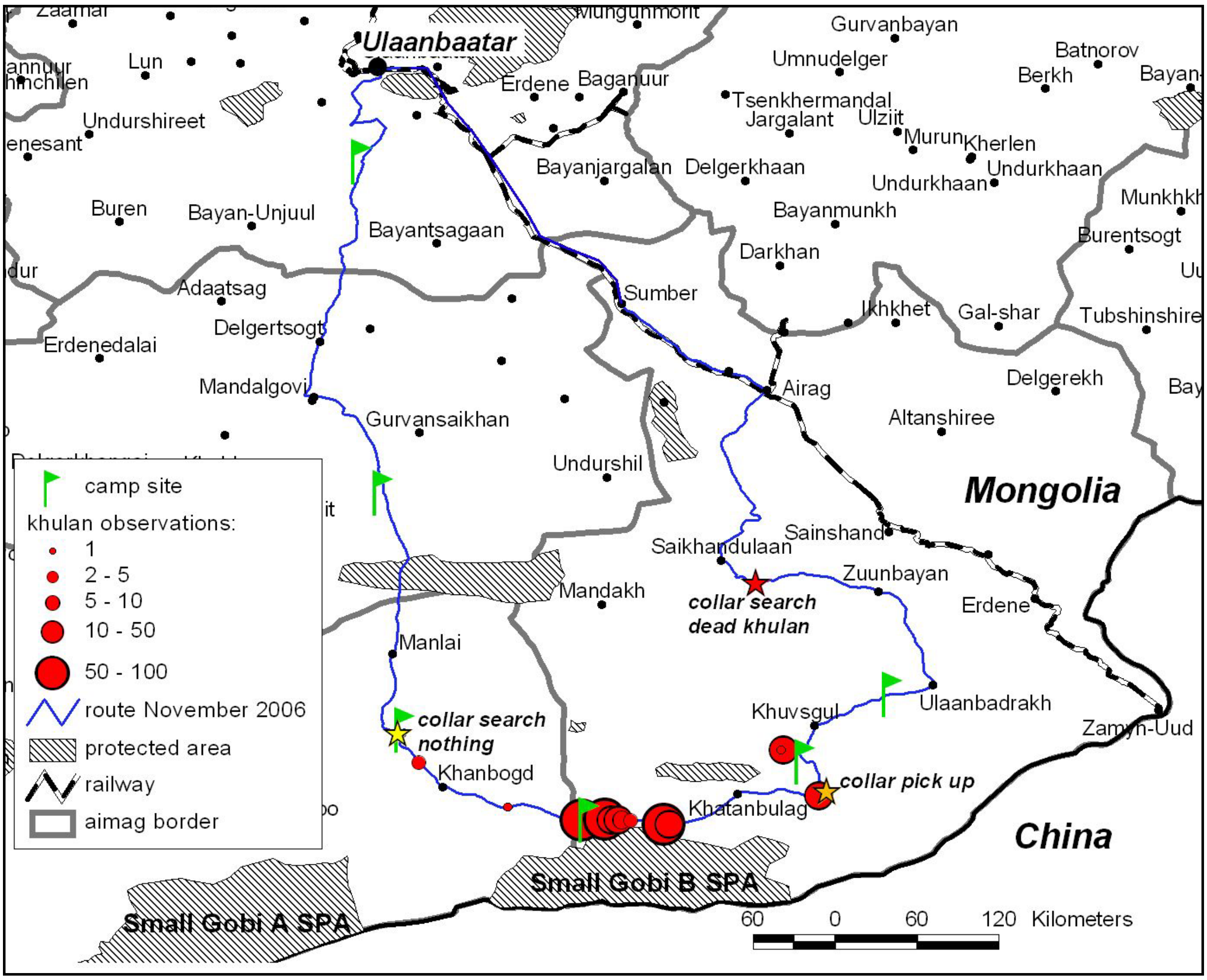


Fig: 7: Ground route to the SE Gobi 10-17 November 2006.

Although pasture condition was very good, we encountered only small numbers of wild ungulates. In total we counted 423 khulans in 14 groups, mainly in the southern half of the study area (Fig. 6, Fig. 8). We additionally saw about 30 Mongolian gazelles and 1 argali.

Fig. 8: Khulan group encountered just north of the Great Gobi B SPA.

Consequences of the failed aerial survey

To cancel this mission was a hard blow to the project. A lot of manpower, equipment and funds had to be pulled together for nothing. Furthermore 4 collars full of valuable movement data are still laying around somewhere in the SE Gobi – information that is urgently needed to better understand khulan ecology and work towards a sound conservation strategy.

On the positive side, at lot of people have helped in the planning process and shown the high national and international interest in setting up a sound monitoring of wildlife in the Gobi areas of Mongolia. Interested agencies, organizations, projects or individuals should join forces to organize a suitable fixed winged aircraft with an experienced pilot. We are more than willing to share our experiences, equipment and what is left of our limited funds. A possible alternative to renting a small plane might be the purchase of a small plane by a consortium of projects and the establishment of a "wildlife/nature conservation aviation business" in Mongolia.

The unprofessional behavior of the aviation company Air Future was bad enough, however what was even more irritating was the lack of support from the Mongolian Ministry of Environment and the open opposition by the Commission of Endangered Species. This needs to be resolved if we are to continue with any research activities and will be a priority thoughout the winter.

Acknowledgements

For the planning of this aerial survey a lot of people provided support and valuable information. In particular I would like to thank Markus Borner, Bob Hayes, Grant Hopkraft, Henry Mix, Kirk Olson, and Rich Reading for information about theoretical and practical aspects of aerial surveys. For various aspects on DISTANCE sampling I am grateful for advice from Len Thomas, Duane Diefenbach, Falk Huettmann, and Daniel Pike. Namtar Enksaikhaan and Davaa Lkhvasuren got to bear most of the organizational burden - many thanks! I would also like to thank Mrs. J. Oyusuvd from Ivanhoe Mines for her support of our work and the offer to house and feed us at Oyu Tolgoi – I hope we are welcome again another time. Last but not least, I am grateful for the enthusiasm of Bob Hayes, Ulrich Wotschikowsky, Davaa Lkhvasuren and Adiya Yadamsuren to join me on this mission – I really hope we will have another chance to complete what we actually wanted to do.

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