

ESIA Appendix 4

Biodiversity offsets strategy for the Oyu Tolgoi project

April 2012

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1 Executive Summary

To reach Net Positive Impact, biodiversity offsets are required for the Oyu Tolgoi project. These offsets constitute actions over a large Offsets Landscape of c. 50,000 km² across the soums east and west of Khanbogd soum. To compensate for project residual losses, gains may be generated through reducing hunting levels, improving rangeland management and strengthening protected areas. It is estimated that hunting levels can be reduced by 25% in the next 25 years; and about 10% of this offset landscape can be improved in habitat condition by just 7.5%. These estimates are precautionary and allow for uncertainties, and risks of partial failure. An investment of c.\$70 million is likely to be required to capitalise a fund to finance these activities over this timescale. This offsets strategy requires full stakeholder consultation to develop into a stakeholder and government agreed Biodiversity Offsets Plan. The Rio Tinto Offset Design process provides a useful framework for taking this process forward.

This offsets strategy has been written for the Oyu Tolgoi project to assess the technical feasibility of biodiversity offsets to achieve Net Positive Impact in the long term. This strategy requires extensive stakeholder consultation and review to progress the document to being the officially endorsed strategy and then towards a stakeholder agreed plan. Hence this current document indicates the 'Technical Feasibility' of offsets, but it does not define locations or address 'Political Feasibility'.

The Oyu Tolgoi project has attempted to follow the mitigation hierarchy, whereby the project avoids, minimises, mitigates, rehabilitates and restores and finally offsets its negative impacts on biodiversity. The Oyu Tolgoi project is committed to having a Net Positive Impact on biodiversity, in which the gains generated by offsets are greater than the residual losses of project impacts, as required by the project lenders and Rio Tinto corporate policy. The highest-profile species involved; the Khulan or Asiatic Wild Ass, could be adopted as a flagship icon for Oyu Tolgoi's offsets programme.

The predicted residual impacts from the project are primarily an increase in illegal hunting and collecting, habitat loss and collisions with powerlines, each for a number of priority biodiversity features. These will be addressed by the following offset objectives:

- Reduce illegal hunting
- Improve rangeland management
- Reduce the impacts of non-project powerlines (elsewhere in southern Gobi region)
- Strengthen protected areas management
- Demonstrate and contribute to best-practice regional development
- Establish strong enabling mechanisms
- Monitor and evaluate
- Build Oyu Tolgoi capacity

Given the very large geographical ranges of individual Asiatic Wild Asses impacted by the project and the limited improvements anticipated per unit area, offset actions must be undertaken over very large areas. The final offsets landscape will be determined based on proper stakeholder consultation. However given the known distribution of Asiatic Wild Ass and the calculated required spatial scale of offset activities required to produce Net Positive Impact, an area the size of Bayan-Ovoo, Khatanbulag and Khuvsgul soums will be required as the Offsets Landscape. Note this excludes the Small Gobi Special Protected Area, where compensation actions are already mandated; and Khanbogd soum, where most actions will be

mitigations rather than offsets. This offset strategy takes into account the precautionary principle and acknowledges the significant uncertainties involved in offset design and implementation. Therefore the strategy's scale and proposed interventions aim to exceed the minimum requirements with a significant contingency.

One important but often neglected aspect of conservation programmes is monitoring and evaluation to feed into adaptive management. This is of particular importance for demonstrating NPI where losses and gains need effective monitoring and evaluation, including quantified measures of success and triggers for action and review. The proposed offsets actions require long-term commitment and may be best financed by an up-front investment in a long-term financing mechanism (such as a trust fund). It is anticipated that this would require an up-front investment of approximately \$70 million to deliver the necessary resources. The Oyu Tolgoi project does not wish for the Offsets Plan to be implemented by expatriate staff in external institutions but wishes to build the capacity of its Mongolian staff.

The Oyu Tolgoi project will discuss and revise this strategy with stakeholders, notably the Government of Mongolia and other regional developers and planners including The Nature Conservancy's *Development by Design* - Gobi Region Landscape Assessment project. Actions need to start as soon as practical to minimise the risk of third-party negative impacts within the offset landscape. Actions need to be integrated with the project's biodiversity mitigation plans and its social development plans. If the proposed actions are successfully implemented, it is considered to be 'Technically Feasible' for the Oyu Tolgoi project to have a Net Positive Impact on biodiversity by the time of project closure. The offsets strategy calculates losses and gains within a timeframe 2011-2036, a period of 25 years which is reasonable for stakeholder requirements and potentially realistic for NPI.

Adequate staffing and resourcing at appropriate levels within Oyu Tolgoi is required in order to ensure Net Positive Impact and compliance with supporting lender requirements.

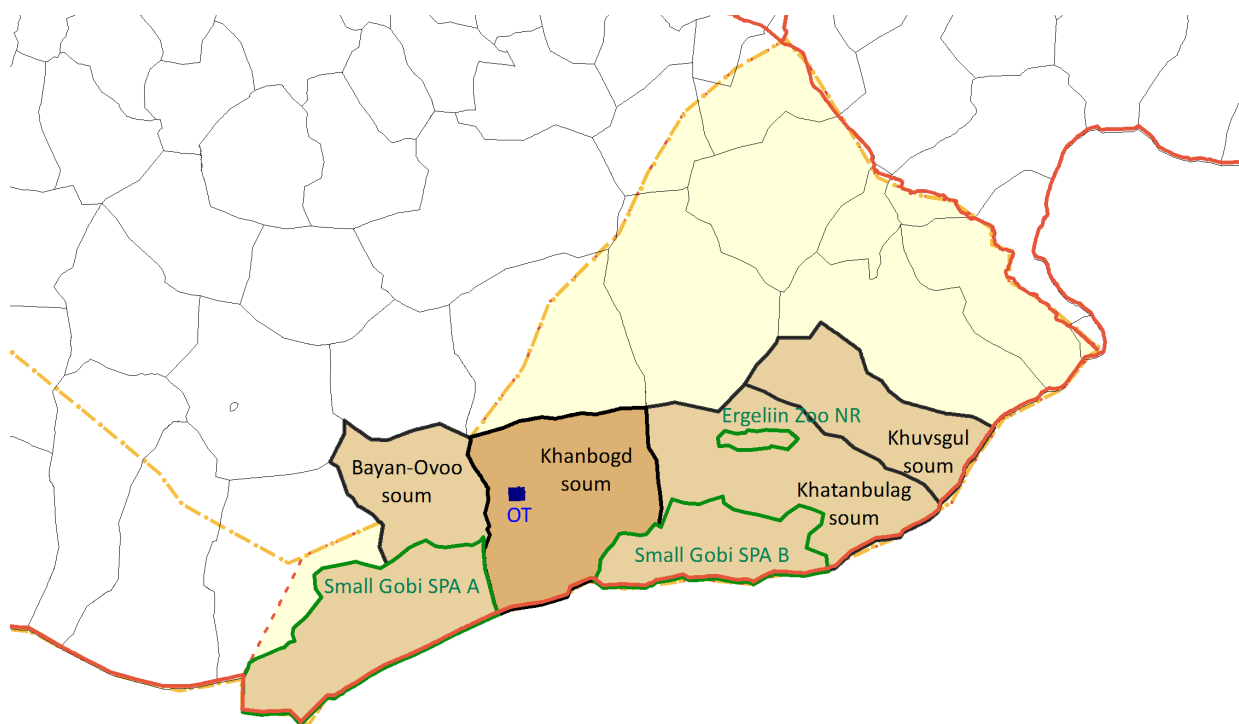


Figure 1: Potential Offsets Landscape (mid-brown), Buffer Zone (yellow) and mitigation zone (dark brown)

2 Context and objectives

2.1 Purpose and business case

This Biodiversity Offsets Strategy outlines what needs to be achieved for the Oyu Tolgoi project to have a Net Positive Impact (NPI) on biodiversity. This strategy is based on wide technical consultation and aims to demonstrate the ‘Technical Feasibility’ of achieving NPI. This strategy has not yet been formally endorsed by the Oyu Tolgoi project, but it is a proposal which will undergo extensive stakeholder consultation in 2012 and 2013 to generate a formal stakeholder agreed and financed Offsets Plan. It is written by the Rapid Biodiversity Assessment team with input from Oyu Tolgoi LLC and is complemented by the accompanying appendices:

- Appendix 1 Oyu Tolgoi LLC Biodiversity Strategy
- Appendix 2 Critical Habitat Assessment
- Appendix 3 Biodiversity Impacts and Mitigation Actions
- Appendix 5 Net Positive Impact forecast
- Appendix 6 Monitoring & Evaluation

The business case for the Biodiversity Offsets Strategy includes compliance with lender requirements (and reduced project delays), compliance with the Rio Tinto Biodiversity Strategy (2004, 2008), and potential for becoming a developer of choice in Mongolia, including access to land and resources and a seat at the policy table. Hence, the Biodiversity Offsets Strategy fulfils the requirements of the project’s lenders, notably the International Finance Corporation’s Performance Standard 6 (IFC PS6) and the European Bank for Reconstruction and Development’s Performance Requirement 6 (EBRD PR6). Further, it demonstrates mining leadership in the region, ‘raising the bar’, and encouraging cumulative activities to ensure the project operates within a sustainable landscape in which offsets are viable. Rio Tinto’s Biodiversity Strategy (Rio Tinto 2004, 2008) and commitment to Net Positive Impact will thus confer a significant reputational gain to the Oyu Tolgoi project. This reputation will be increasingly valuable in the company’s ongoing relationship with the government of Mongolia and other governments responsible for allocating exploration and mining licences and conditions.

2.2 Social, political and economic context of the southern Gobi region

Economic activity in Mongolia has traditionally been based on herding and agriculture, but extensive mineral deposits have recently attracted foreign investors and now account for a large part of government revenues. Severe winters and summer droughts (*dzuds*) in 2000-02 (and again in 2010) resulted in massive livestock die-off and zero or negative GDP growth but growth averaged nearly 9% per year from 2004-08 largely because of high copper prices. In October 2009, the government passed legislation to develop Oyu Tolgoi, one of the world’s largest untapped copper deposits. The Asian Development Bank (2011) notes that private sector development is impeded by a “harsh climate, small domestic market, human resource constraints, infrastructure bottlenecks, corruption, legal inadequacies, weak contract enforcement, and poor capital markets” while “Mongolia’s economic recovery has been accompanied by a substantial degradation of its natural resource base.” The Asian Development Bank (2011) specifically identifies overgrazing and the unsustainable management of water basins as factors that have “undermined living standards and hampered growth”. These are factors that the four-year World Bank Country Assistance Strategy, currently

being renewed, has been aiming to address through “enhancing regional, rural and environmentally sustainable development”. Meanwhile, as well as focusing on mining, the Government of Mongolia has also identified a need to modernise the country’s livestock industry. Through their ‘Mongol Mal Program’, the government will pay more attention to livestock, seeing herders as manufacturers and providing financial and technical, including veterinary, education and assistance to them (<http://www.infomongolia.com/ct/ci/900/60/>). This aligns with some of the activities in this offsets strategy, increasing their chances of being seen as ‘politically feasible’. However, elections are due by June 2012, which could result in an altered focus from any new incoming decision-makers. Irrespective of specific government policies, Mongolia’s international commitments to the Convention on Biological Diversity, iterated within its Biodiversity Conservation Action Plan (1996) contains specific Action Programs that are supportive of all the key elements of this Offset Strategy. The integration of this offset strategy with national and regional government policies for natural resource management and nature conservation is a key component of the next phase, to development of a full Offsets Plan.

2.3 Priority biodiversity values

Priority biodiversity features are defined as species or habitats which trigger Critical Habitat as defined by the lenders (IFC PS6 and EBRD PR6) or which are considered significant under Rio Tinto Biodiversity Action Plan guidelines. A number of other priority biodiversity features (Snow Leopard, Long-eared Jerboa, Mongolian Accentor, Ephemeral Lakes and Pools) occur in the Units of Analysis (as defined in Appendix 2 Critical Habitat assessment) but are not Critical Habitat qualifying-features and, because they have no significant predicted impact, are excluded from Table 1, which solely addresses features covered by the Offsets Strategy. ‘Granite outcrop floral communities’ are not predicted to be impacted, but are a Critical Habitat-qualifying feature and – owing to stakeholder concerns – are thus precautionarily included in the offsets strategy. Ecosystem services are considered to be a component of biodiversity but offset actions for ecosystem services are not discussed here because these need socio-economic, rather than biodiversity, assessment.

Table 1: Priority biodiversity features addressed by the Offsets Strategy

Taxonomic group	Biodiversity feature	Scientific name	Critical Habitat	IUCN Red List status	National Red List status	Status in unit of analysis
Plant (herb)	Mongolian Chesney ¹	<i>Chesneya/Chesniella mongolica</i>	Tier 2	-	EN?	Patchily distributed throughout
Mammal (ungulate)	Asiatic Wild Ass	<i>Equus hemionus</i>	Tier 1	EN	EN	Nomadic 'resident'
Mammal (ungulate)	Argali	<i>Ovis ammon</i>	Tier 2	NT	EN	Localised resident
Mammal (ungulate)	Goitered Gazelle	<i>Gazella subgutturosa</i>	Tier 2	VU	VU	Migratory 'resident'
Mammal (ungulate)	Mongolian Gazelle	<i>Procapra gutturosa</i>	-	LC	EN	Rare visitor from the east
Migratory Bird	Swan Goose	<i>Anser cygnoides</i>	-	VU	NT	Likely a regular migrant over the area
Migratory Bird	Ferruginous Duck	<i>Aythya nyroca</i>	-	LC	VU	Likely a regular migrant over the area
Bird	Short-toed Snake-eagle	<i>Circaetus gallicus</i>	Tier 2	LC	EN	Breeds
Bird	Saker Falcon	<i>Falco cherrug</i>	-	VU	VU	Breeds
Bird	Egyptian Vulture	<i>Neophron percnopterus</i>	-	EN	LC	Probably breeds
Migratory Bird	Great Bustard	<i>Otis tarda</i>	-	VU	VU	Regular migrant (stops over in the area)
Bird	Houbara Bustard	<i>Chlamydotis undulata</i>	-	VU	VU	Breeds
Migratory Bird	Relict Gull	<i>Larus relictus</i>	-	VU	EN	Likely a rare migrant over the area
Bird	Pallas' Sandgrouse	<i>Syrrhaptes paradoxus</i>	-	LC	LC	Breeds
Bird	Mongolian Ground-jay	<i>Podoces hendersoni</i>	-	LC	VU	Breeds
Migratory Bird	Yellow-breasted Bunting	<i>Emberiza aureola</i>	-	VU	NT	Likely a regular migrant
Species Assemblage	Granite Outcrop Floral Communities	n/a	-	n/a	n/a	Khanbogd massif and other massifs
Habitat	Riverine Elm Trees	n/a	-	n/a	n/a	Mostly in Undai riverbed
Habitat	Tall Saxaul Forest	n/a	-	n/a	n/a	Mostly in borefield and depressions
Habitat	Eastern Gobi desert-steppe	n/a	-	n/a	n/a	Major habitat type in the region - widespread
Habitat	Alashan Plateau semi-desert	n/a	-	n/a	n/a	Major habitat type in the region - widespread

2.4 Distinguishing Oyu Tolgoi mitigation from offset commitments

OT has committed to a suite of mitigation actions within Khanbogd soum as detailed in Appendix 3 (Biodiversity Impacts and Mitigation Actions). The biodiversity offsets strategy should be designed and implemented with reference to these mitigation actions and also the project's social/community programme. As the primary offset action is similar to the mitigation action of reducing illegal hunting, for simplicity actions to reduce illegal hunting in Khanbogd soum are labelled as mitigations, and actions in other soums are labelled as offsets. Similarly,

¹ An umbrella species for 18 poorly known possibly threatened plants which may possibly occur in the project area. These are all considered, on present knowledge, to have similar impacts and mitigation/offset measures and so are represented here by this one species.

fitting ‘bird flight deflectors’ to powerlines are considered mitigation actions when undertaken on project powerlines, but offset actions when on non-project powerlines.

2.5 Residual impacts, NPI and offsets

The predicted impacts of the Oyu Tolgoi project on priority biodiversity features are analysed in Appendix 3 (Biodiversity Impacts and Mitigation Actions). Mitigation actions were identified for all impacts predicted to have a High Risk or Critical Risk on these species. Residual impacts are the net impact after the Oyu Tolgoi project has taken all practicable actions to avoid, minimise, rehabilitate and restore its impacts (Figure 2), as documented in Appendix 3. Residual impacts were quantified in Appendix 5 (NPI forecast) and summarised as:

- *Direct habitat loss* will occur due to the Oyu Tolgoi project’s physical infrastructure footprint, notably 64 km² in the mine licence area
- *Indirect habitat loss* will also be caused for some priority biodiversity features because hunted species avoid areas close to project infrastructure and activities due to human and vehicle activity, noise and dust (to varying degrees). For example, Asiatic Wild Ass in the southern Gobi region show avoidance of areas within at least 5 km of vehicles (P. Kaczensky *in litt.* 2011), and impacts have been demonstrated up to 1,600 m for Great Bustard (Lane *et al.* 2001; López-Jamar 2010; Raab 2011). Species-specific estimates of likely avoidance distances, taking into account habitat type, threat of hunting etc, were made for each species concerned.
- *Illegal hunting* of wild animals and illegal collecting of plants (e.g. for firewood) will increase as secondary impacts of increased human population drawn to the area by the Oyu Tolgoi project.

A Net Positive Impact on biodiversity means minimisation of project impacts and contribution to biodiversity conservation to ensure that the region ultimately benefits as a result of a company’s presence (Figure 2). To achieve NPI, OT offsets need to generate more ‘gains’ in priority biodiversity features than these residual losses. These gains are additional to the project’s mitigation actions.

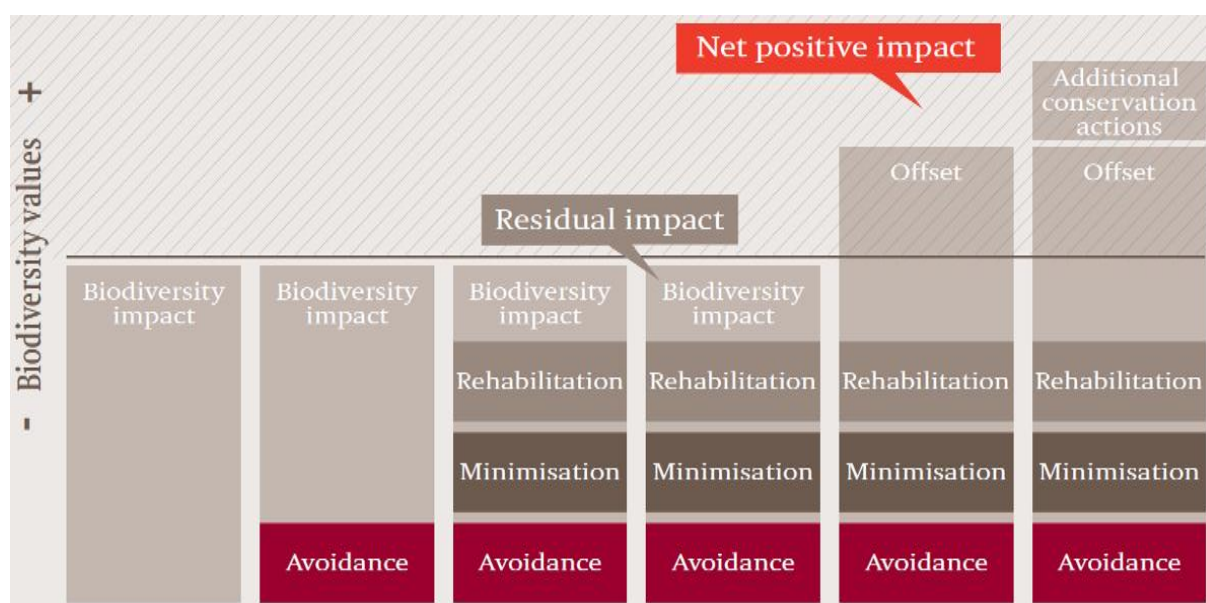


Figure 2: Rio Tinto’s mitigation hierarchy, and net positive impact

The NPI forecast (Appendix 5) calculates the scale of offsets necessary to achieve NPI. A

nominal time of 25 years to reach NPI was set. This is based on some very approximate estimations of the likely improvement in the rate of illegal hunting and the quality of rangeland habitat. While aware that these estimations lead to considerable uncertainty in the final figures, the forecast estimates that offset areas need to be in the order of:

- Control of illegal hunting across c.50,000 km²
- Improving rangeland management across c.50,000 km²
- Mitigate impacts of 64 km of non-OT powerlines

A quantified summary of the predicted losses and projected gains is given in Table 2, for which more details are available in Appendix 5 (NPI forecast):

Table 2. Projected net position in 2036 for priority biodiversity features addressed by the offsets strategy (Quality Hectares)

Name	Direct & indirect habitat loss (1000 ha)	Quality of habitat lost (0-1)	Loss from increased hunting (1000 QH)	Residual loss (1000 QH)	Gain from hunting control (1000 QH)	Gain from rangeland management (1000 QH)	Predicted overall offset gain (1000 QH)	Net position (1000 QH)	NPI?
Mongolian Chesney ¹	9	0.9		8	0	21	21	13	Yes
Asiatic Wild Ass	155	0.5	392	470	530	21	551	59	Yes
Argali	30	0.5	392	407	530	21	551	122	Yes
Goitered Gazelle	130	0.5	392	458	530	21	551	72	Yes
Mongolian Gazelle	76	0.5	392	431	530	21	551	99	Yes
Swan Goose	0			0	0	0	0		Yes ²
Ferruginous Duck	0			0	0	0	0		Yes ²
Short-toed Snake-eagle	9	0.9		8	0	21	21	13	Yes ²
Saker Falcon	9	0.9		8	0	21	21	13	Yes ²
Egyptian Vulture	9	0.9		8	0	21	21	13	Yes ²
Great Bustard	71	0.9		64	0	21	21	-43	No ^{2,3}
Houbara Bustard	71	0.9		64	0	21	21	-43	No ^{2,3}
Relict Gull	0			0	0	0	0		Yes ²
Pallas' Sandgrouse	9	0.9		8	0	21	21	13	Yes ²
Yellow-breasted Bunting	9	0.9		8	0	21	21	13	Yes
Mongolian Ground-Jay	9	0.9		8	0	21	21	13	Yes
Granite Outcrop Floral Communities ⁴	0			0	0	0	0	0	Yes
Riverine Elm Trees	0			0	0	+	+	+	Yes ⁵
Tall Saxaul Forest	+	?	-	+	+	+	+	+	Yes ⁶
Eastern Gobi desert-steppe	5.5	0.9		5	0	9	9	4	Yes
Alashan Plateau semi-desert	3.5	0.9		3	0	12	12	9	Yes

¹ Assumed here to represent all 18 'very rare' plants known or predicted from the project area

² Assuming mitigation is put in place on all OT powerlines plus an additional >64km of non-OT powerlines

³ Yes if there is an appropriate additional offset

⁴ Even though these are not predicted to be impacted, they are included here since they are a Critical Habitat-qualifying biodiversity value in the area

⁵ Yes if the three translocated trees survive; offset gains depend on specific offset site

⁶ Yes assuming adequate control of illegal collecting (not quantified)

To be precautionary, losses and offsets gains were estimated against a static baseline, meaning that there is assumed to be no acceleration in development in the southern Gobi region and

concomitant increased impacts on biodiversity. An alternative counterfactual situation of greatly accelerated growth related to additional mines (although acknowledged by the project to be more realistic) was not used as this would be difficult to quantify, assume ineffective mitigation and be non-precautionary. Furthermore, there is experience that stakeholders are unlikely to accept large background rates of loss as the baseline against which losses and gains are measured (Temple *et al.* 2011). An estimate of predicted future growth could be factored into the NPI forecast based on the best opinion of regional planning experts. The project's success in addressing cumulative regional impacts would need to be factored into this estimate. The current assumption of no accelerated impacts is therefore precautionary but subject to revision.

Strengthening Protected Areas is an important enabling/supporting offset action to ensure sustainability of Protected Areas, the offset outcomes and biodiversity gains required for NPI.

3 Offset design

This Offsets Strategy is based on dedicated offset intervention research, literature reviews, expert consultation, other biodiversity papers prepared for (or by) the Oyu Tolgoi project, and other published information. This version has benefited from the Critical Habitat Assessment, the eight Biodiversity Management Plans, the Environmental and Social Impact Assessment, and publications as listed in the references. A broad group of specialists has been consulted and questioned in designing the strategy, as listed here. In addition, a dedicated rangeland management workshop was organised at the World Bank in Washington D.C. on 20 December 2011. The authors are grateful for the expert opinion of Nyambayar Batbayar (Wildlife and Conservation Science Centre of Mongolia), Chimed-ochir Bazarsad (WWF Mongolia), Amanda Fine and Ray Victorine (Wildlife Conservation Society), Sundev Gombobaatar (National University of Mongolia), Petra Kaczinsky (University of Veterinary Medicine Vienna), Robin Mearns (World Bank Social Team), Erdenesaikhan Naidansuren (Environ LLC), Kirk Olson (University of Massachusetts), Dennis Sheehy (International Center for the Advancement of Pastoral Systems) and Tungalag Ulambayar and Maria Fernandez-Gimenez (Mongolian Rangelands Research Team, Colorado State University).

The offset design process has been guided by the Rio Tinto Biodiversity Offsets Guidance (Rio Tinto 2011), itself developed based on growing international expertise on biodiversity offsets (e.g. Australian Government regulatory requirements and guidance, and Business and Biodiversity Offsets Program 2011a, 2011b).

3.1 Methods

Together with Appendix 5 (NPI forecast), the first three of the four stages of Offset Design outlined within the Rio Tinto Offsets Design Guidance (Figure 3) were followed in this Offsets Strategy:

1. **Offset Scoping** – goals were identified and a list of potential sites in the country were broadly considered as possibilities for offsets.
2. **Offset Screening** – the potential offset sites were screened against biological, political, economic and social criteria. This involved brief consideration of possible types of conservation intervention and additionality criteria: what actions could be undertaken and would these make a real difference on the ground? Offset financing was calculated based on these required actions.

- 3. Net Positive Impact (NPI) Accounting** – estimates of projected biodiversity gains were made. This is in fact a transaction process, part of which is required to estimate the magnitude of the interventions required in Offset Screening.
- 4. Final Approval and Selection** – this Biodiversity Offsets Strategy will be discussed with stakeholders for consultation, revision and agreement as a Biodiversity Offsets Plan.

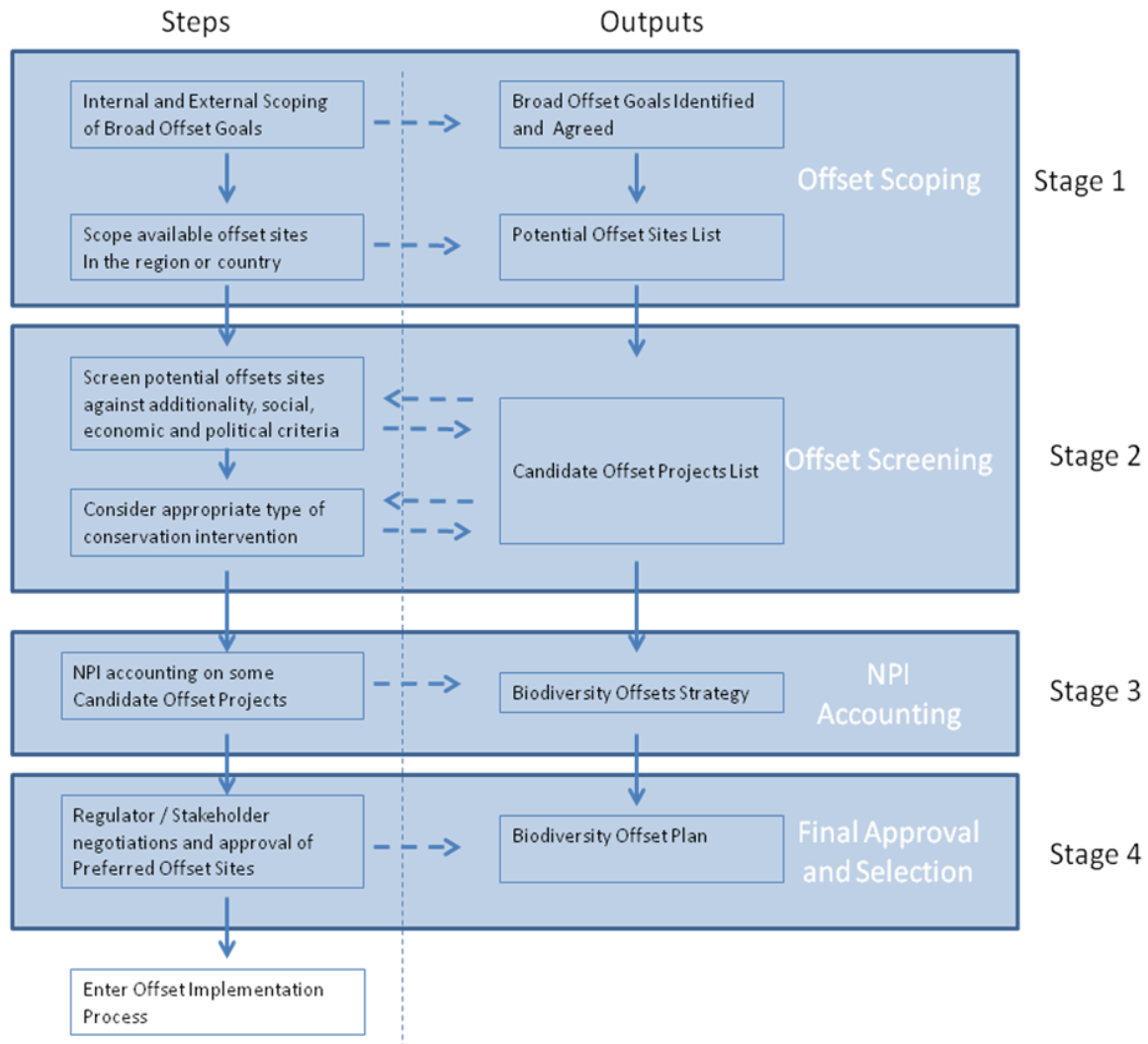


Figure 3: Four stages of offset design from draft Biodiversity Offset Guidance (Rio Tinto 2010). This document represents Stage 3 Outputs – ‘Offsets Strategy’

Potential offset actions were developed to effect gains in priority biodiversity features addressed by the offset strategy compared with background rates of loss (e.g. hunting) and potential rates of restoration (e.g. rangeland management). These estimates were all based on expert consultation. The residual impacts and other impacts (including those caused by factors external to the Oyu Tolgoi project) were analysed to assess the ultimate and proximate factors causing negative impacts on the priority biodiversity features addressed by the offsets strategy. Conservation interventions already implemented elsewhere in Mongolia (e.g. by WWF) were analysed to assess which actions could address the project’s impacts and which

were most effective, lowest risk, most practical and socio-politically feasible. The interventions that appeared to be most suitable were then aggregated into generic potential offset actions.

The process for identifying potential offsets sites and the Offsets Landscape is discussed below.

3.2 Offset site selection

Offset site selection within the Rio Tinto Offset Design Process leads to a larger 'Potential Offsets Sites' list based on biological criteria alone; then a smaller 'Candidate Offset Sites' list based on screening against requirements for offset interventions (spatial scale, gains required versus offset interventions), and social, political and economic constraints and opportunities. In the case of the Oyu Tolgoi project, Potential Offset Sites are severely constrained by the global and national distribution of Asiatic Wild Ass, the largest and highest priority residual impact requiring offsetting. There are three major populations in the South Gobi, so only three 'Potential Offset Sites' or landscapes exist. Its largest global population occurs within and to the east of the project area, making this area the most suitable and likely offset site. This population, located across several soums, is relatively small and conservation actions are required across the core area of c.50,000 km² to bring about the required conservation gains. There are a number of political, economic and social constraints which therefore have to be faced within this chosen offset site, which is effectively an offset landscape given the broad spatial scale over which actions are required to reduce hunting and improve rangeland management.

3.2.1 Spatial scale, barriers and boundaries

Scale: The scale of Offsets Landscape is dictated by the scale of the residual impacts and the 'offsets ratio'. In this case, no generic offsets ratio was applied; instead an area was calculated for each priority biodiversity feature based on a precautionary estimate of the gains likely to be achieved by offset actions over the defined time period of 25 years until 2036². As detailed in Appendix 5 (NPI forecast), although very approximate, this estimates that offsets areas need to be in the order of tens of thousands of square kilometres.

Barriers: Intact fences are barriers to Asiatic Wild Ass and gazelle movement (Kaczensky *et al.* 2010; Olson *et al.* 2009). Main roads are likely to act as impermeable barriers to Asiatic Wild Ass if they support more than about one vehicle every 15 minutes, i.e. c. 100 vehicles/day (P. Kaczensky *in litt.* 2011). Current and proposed fences, railways and busy roads in the southern Gobi region that could act as barriers include:

- Ulaanbaatar – Beijing railway (north-south)
- Mongolia - China border fence (west-east)
- Proposed Tavan Tolgoi – Sainshand railway (west-east)
- Tavan Tolgoi – Gashuun Sukhait road (north-south)
- Proposed Tavan Tolgoi – Gashuun Sukhait railway (north-south)
- Oyu Tolgoi – Gashuun Sukhait road (north-south)
- Khanbogd – Oyu Tolgoi road (west-east)

²If the total gains required are 1500ha of pristine rangeland, and the conservation interventions are predicted to provide 0.1ha 'gain' per ha by 2036, then the minimum offset site area for no net loss for this time period is 1500/0.1 = 15,000ha, hence a ratio of 10x. Issues such as uncertainty, risk, and time discounting will likely mean the total offsets intervention should be greater than this. Offset ratios are not however necessarily the best method to deal with offset risk etc.

Boundaries: Most of the priority biodiversity features addressed by the offsets strategy that have residual impacts occur across extensive areas of contiguous habitat. At a broad level (disregarding micro-habitat variation), these ecosystems vary little over distances of hundreds of kilometres, and there are few clear boundaries delineating candidate offset areas. Potential boundaries were based on the base-case development scenarios outlined in the World Bank regional environmental assessment (Walton 2010) and recommendations for safeguarding important habitat alongside economic development (BirdLife Asia 2009). The southern Gobi region habitat is currently mapped at a coarse scale and habitat condition is very dependent on stochastic precipitation patterns, so only very coarse-scale habitat maps were used at this stage. More detailed research on habitat types will form part of the monitoring to feed into the Offsets Plan.

Given the lack of distinct habitat types, their variation in space and time, and the related nomadic behaviour of key ungulates, administrative boundaries are an appropriate boundary for defining offsets. Souns are the most appropriate level. Most offset actions will be administered and delivered at a soum level, whereas aimag-level actions are impractical for on-the-ground delivery, and bag-level actions would lack the necessary authority. Potential barriers, Protected Areas, Important Bird Areas and soums are shown in Figure 4:

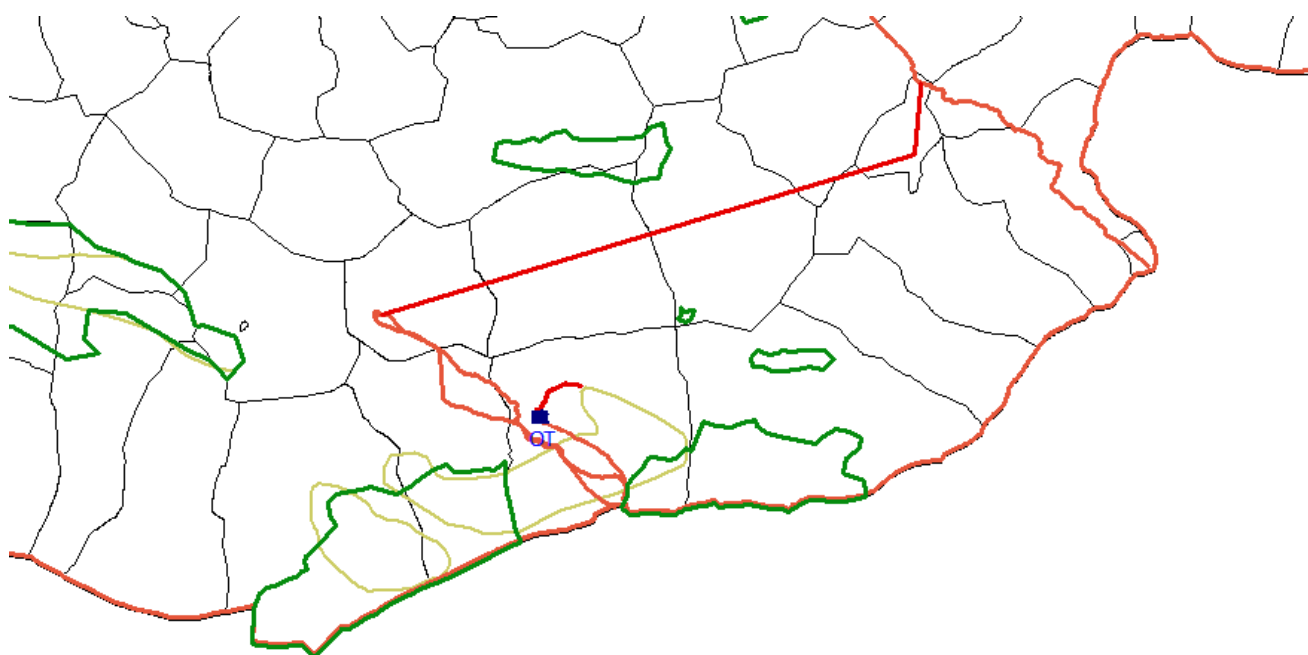


Figure 4: Potential offset boundaries: barriers (red), protected areas (dark green), important bird areas (light green) and soums (black)

This Offsets Strategy proposes that the Offsets Landscape could potentially be the soums overlapping with the core population of Asiatic Wild Ass, harbour the majority (or all) of the priority biodiversity values suffering residual impacts, and be closest to the Oyu Tolgoi project. The areas of several of these soums were combined to just exceed the area estimated to be needed to achieve sufficient biodiversity gains for NPI, based on the NPI accounting. Excluding Khanbogd soum as the area for mitigation activities and the Small Gobi SPA (A&B) as an area for specific mandated compensation, the potential Offsets Landscape is therefore Bayan-Ovoo, Khatanbulag and Khuvsgul soums (Figure 5). This can only be confirmed through thorough stakeholder consultation. A further technical consideration is the risk that rangeland habitat

quality gains cannot be achieved in the ‘non-equilibrium’ drier habitats, and these offset actions need to be extended to wetter habitats to the east.

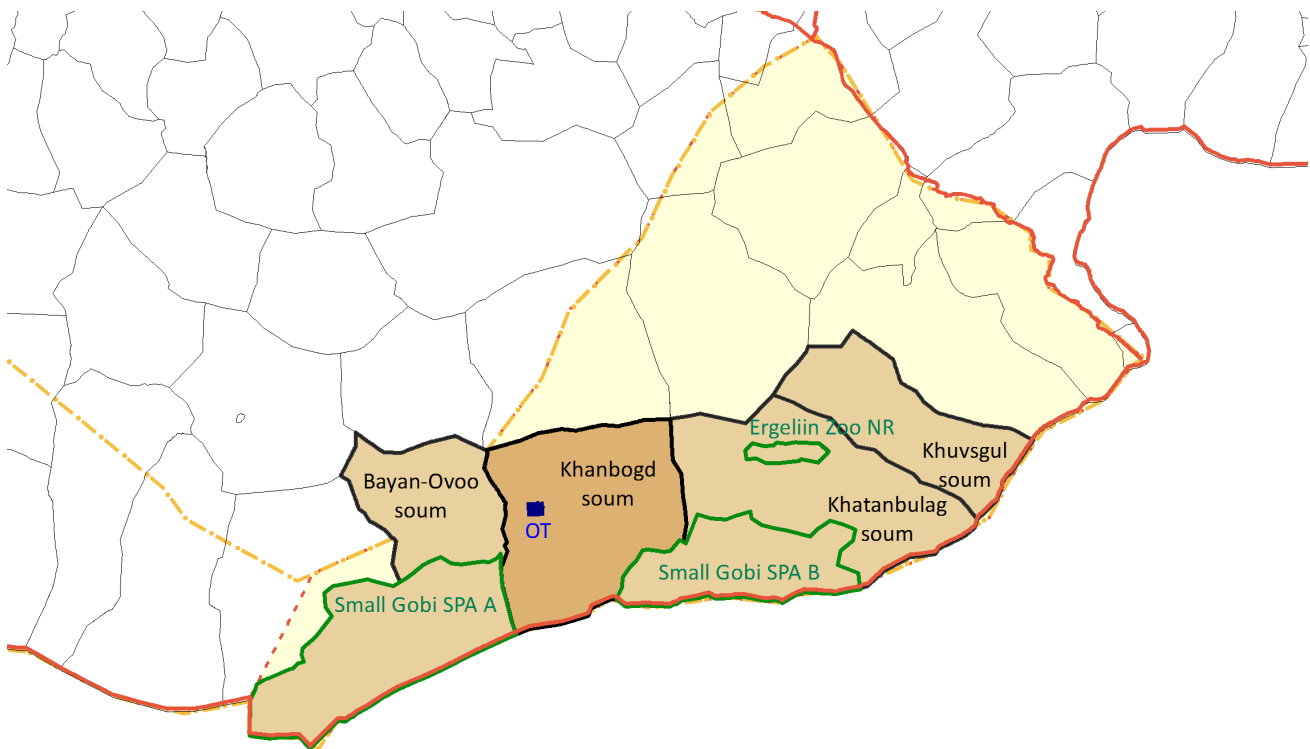


Figure 5: Potential Offsets Landscape (mid-brown) and Buffer Zone (yellow) around mitigation zone (Khanbogd soum; dark brown)

To ensure the long-term survival of the Asiatic Wild Ass subpopulation in the south-eastern Gobi, some activities to reduce illegal hunting may be needed across the range of this subpopulation. Asiatic Wild Ass utilise very large areas to find patchy food resources in this climatically irregular and drought-prone environment. Given that the area (minimum convex polygon) used by individual Asiatic Wild Asses in the south-east Gobi ranged from 11,400 km² (over 18 days) to 70,000 km² (over 297 days) (Kaczensky *et al.* 2011), individuals may wander over much of the subpopulation range and be at risk from any illegal hunting outside of the Offsets Landscape. It is therefore proposed to define the subpopulation range as Buffer Zone for the Offsets Landscape, with activities undertaken within this buffer zone to reduce illegal hunting. The eastern boundary of the Buffer Zone (shaded yellow in Figure 5) is the fenced Ulaanbaatar-Beijing railway, the southern boundary is the mostly fenced Mongolia – China border and the northern and western boundaries are estimated based on expert opinion (P. Kaczensky *in litt.* 2011) supported by satellite-tagging, surveys and recent literature (e.g. Kaczensky *et al.* 2008, 2010, 2011; Moehlman *et al.* 2008). Recent genetic connectivity with western sub-populations has been demonstrated (Kaczensky *et al.* 2011) but the Tavan Tolgoi – Gashuun Sukhait road may now act as a barrier. The boundaries of this Buffer Zone will be revised based on outcomes of the project’s monitoring and evaluation programme.

3.2.2 Which priority biodiversity values occur at which offset sites?

The aim of this step in the Offsets design process is to identify which biodiversity values suffering residual impacts are to be found at which offset sites. Offset site selection and project design aims to minimise costs and maximise gains to biodiversity by where possible

designing projects which lead to multiple benefits to different biodiversity values within a single site or landscape. This is effective and integrated conservation management.

Most of the priority biodiversity features addressed by the offsets strategy that have residual impacts occur across extensive areas of contiguous habitat and there are few clear boundaries delineating candidate offset areas. Potential boundaries include current and proposed fences, railways and busy roads, protected area boundaries, Internationally Recognised Area boundaries and administrative boundaries. Candidate areas for offset actions were defined based on the Rio Tinto Offset Guidance Note; the principles of the Business and Biodiversity Offsets Program; and the specific criteria that offsets must be within the range of the Asiatic Wild Ass' south-eastern Gobi sub-population's range. Existing protected areas, Internationally Recognised Areas (of which only Important Bird Areas have been identified in this region) and individual soums were considered as candidate areas. Candidate offset areas in the neighbouring protected areas and soums appear to support sufficient quantities of all of the priority biodiversity features addressed by the offsets strategy that have residual impacts, except perhaps Asiatic Wild Ass and Houbara Bustard (Table 3). For Asiatic Wild Ass, the whole range of its south-eastern Gobi sub-population should be considered as part of the Buffer Landscape. For Houbara Bustard monitoring may prove that additional offset sites, where actions are undertaken to address illegal hunting, need to be established outside Mongolia on its migratory route. Other biodiversity features not identified as Critical Habitat triggers or Rio Tinto priorities are likely to be adequately conserved by the Offsets Strategy given their usually large geographical range and more secure conservation status, but this would require specific research to corroborate.

The proposed Offset Landscape is composed of large landscape-scale administrative units. Some offset activities, notably improved rangeland management, will need to be focused in specific areas within the Offset Landscape. The choice of areas will be informed by stakeholder consultation, project monitoring and evaluation and external processes such as The Nature Conservancy's *Development by Design* - Gobi Region Landscape Assessment project.

Table 3: Priority biodiversity features addressed by the offsets strategy in each potential offset area

	TOTAL OYU TOLGOI POTENTIAL BIODIVERSITY OFFSET				
	POTENTIAL OFFSET LANDSCAPE			BUFFER ZONE	Outside Mongolia
	Small Gobi (A+B) SPA	Bayan - Ovoo soum (excl. Small Gobi SPA)	Khatanbulag + Khuvsgul soums (excl. Small Gobi SPA)	Asiatic Wild Ass south-east Gobi range	Houbara Bustard migratory range
PRIORITY BIODIVERSITY VALUES ADDRESSED BY THE OFFSETS STRATEGY					
Eastern Gobi desert-steppe	+	+	+	+	-
Alashan Plateau semi-desert	+	+	+	?	-
Mongolian Chesney	?	?	?	?	-
Asiatic Wild Ass	+	+	+	+	?
Argali	+	+	+	+	-
Goitered Gazelle	+	+	+	+	+
Mongolian Gazelle	?	?	+	+	-
Swan Goose	+	+	+	+	-
Ferruginous Duck	+	+	+	+	?
Short-toed Snake-eagle	+	+	-	-	?
Saker Falcon	+	+	+	+	+
Egyptian Vulture	?	?	?	?	?
Great Bustard	+	+	+	+	-
Houbara Bustard	+	+	+	+	+
Relict Gull	+	+	+	+	-
Pallas' Sandgrouse	+	+	+	+	?
Mongolian Ground-jay	+	+	+	+	-
Yellow-breasted Bunting	+	+	+	+	+
Granite Outcrop Floral Communities	?	+	?	?	-
Riverine Elm Trees	+	+	?	?	-
Tall Saxaul Forest	?	?	?	?	-
Total no. features present	17	16	15	14	4
Total area / km ²	18,000	7,000	21,000	>50,000	?

+ = present

? = possibly present

- = absent

4 Biodiversity offsets strategy

The aim of this section is to elucidate the development of the proposed offset projects based on research and consultation to date, taking into account conservation experience in Mongolia and the biological, social, political and economic constraints evident within the chosen Offsets Landscape.

The aim of OT's biodiversity offsets strategy is:

'to achieve Net Positive Impact on biodiversity through the generation of gains in priority biodiversity features to offset residual project losses'

It is proposed to achieve this aim through a series of six objectives as summarised in the logical framework and detailed below:

- Reduced illegal hunting and collecting
- Improved rangeland management
- Reduced impacts of non-project powerlines
- Strengthened Protected Areas
- Raised bar in regional development
- Strong enabling mechanisms established
- Monitoring and evaluation informs adaptive management
- Oyu Tolgoi capacity built

These objectives and their supporting activities have undergone a process of expert consultation to determine that they are the best available options. Given the poor state of knowledge of ecological baselines and the limited number of analogous previous conservation initiatives, no-one can be absolutely certain as to whether these activities will actually generate the required offset gains. Project stakeholders will be aware that higher certainty of outcomes requires significantly more research time than the six-month period made available for development of this strategy. However, expert opinion³ is that these activities are indeed the most appropriate actions, and will generate gains as proposed (and indeed there is the potential for greater gains as estimates are precautionary). Given the appropriate actions and the proposed contingencies in scale and resourcing, it is the RBA team's opinion that this offsets strategy demonstrates the 'technical feasibility' of achieving the required gains. Following 'technical feasibility', the practical and political feasibility of these activities and outcomes can only be demonstrated through a stakeholder engagement process, as outlined in Section 4.3, and adaptive management during implementation. The outcomes and compliance with lender requirements can only be assessed using a comprehensive Monitoring & Evaluation programme (Appendix 6).

³ T. Ulambayar & M. Fernandez-Gimenez (Mongolian Rangelands Research Team, Colorado State University), D. Sheehy (International Center for the Advancement of Pastoral Systems), R. Mearns (World Bank Social Team), A. Fine (Wildlife Conservation Society) and E. Bowen-Jones (The Biodiversity Consultancy) at a rangeland management expert workshop at World Bank, D.C. on 20 December 2011. Additional expert input was received from Nyambayar Batbayar, Chimed-ochir Bazarsad, Sundev Gombobaatar, Petra Kaczensky, Erdenesaikhan Naidansuren, Kirk Olson, Dennis Sheehy and Ray Victorine.

4.1 Logical framework

AIM	OBJECTIVES	RECOMMENDED ACTIVITIES	OUTCOMES	KEY ASSUMPTIONS
To achieve Net Positive Impact on biodiversity through the generation of gains in priority biodiversity features to offset residual project losses	Reduced illegal hunting and collecting	Implement 5 Mobile Anti-Poaching Units – 3 in the Offsets Landscape and 2 in the Buffer Zone	Reduction in illegal hunting of protected animals	Can achieve reduced demand as well as supply
		Build capacity, resources and networking of government institutions to increase prevention, detection and conviction rates of wildlife crime	Reduction in consumption, trafficking and collection of protected animals	Can recruit staff with charisma and power to enforce law
			Reduction in over-harvesting of saxaul and other fuelwood sources	Can overcome economic, political and community vested interests
	Improved rangeland management	Reduce hunting of bustards migrating outside Mongolia	Increased survival of bustards when away from offsets landscape	Stakeholders support working outside Mongolia
		Support herders to transition to more ecologically sustainable stocking ratios	Reduced degradation of rangeland by livestock leading to improved habitat quality	OT able to establish trust and facilitate transparent conflict resolution around probable tensions between livelihood and conservation objectives.
		Implement conservation incentive scheme to compensate herders for opportunity costs	Increased population of priority biodiversity features	OT able to reduce these conflicts through its social livelihood programmes.
		Develop an alternative livelihoods programme to assist herders' transition to a more biodiversity-friendly system	Reduced disturbance to wild ungulates	Capacity can be built in soum administrations
		Revitalise soum-level grazing planning to enable strategic decisions about herder entitlements and ecologically appropriate stocking levels, in line with national government policy	Increased wild ungulate populations	
	Reduced impacts of non-project powerlines	Install best-practice bird flight diverters on non-OT project powerlines	Reduced bird collisions with powerlines Fewer impacts on bustard populations	OT able to negotiate installation on non-OT infrastructure
	Strengthened Protected Areas	Implement protected area strengthening for Small Gobi SPA	Improved management in existing protected areas	Protected area agencies willing to work with OT
		Review management of Ergeliin Zoo NR and Important Bird Areas, and implement recommendations as appropriate	Improved sustainability of offset actions	Stakeholders support strengthened Protected Areas
		Work with government to review and revise protected area extent and zoning		

AIM	OBJECTIVES	RECOMMENDED ACTIVITIES	OUTCOMES	KEY ASSUMPTIONS
To achieve Net Positive Impact on biodiversity through the generation of gains in priority biodiversity features to offset residual project losses	Raised bar in regional development helps sustain gains	Champion the need for, and benefits of, sustainable and biodiversity-friendly regional development	Agreement to cooperate	Regional Stakeholders support regional planning OT able to facilitate effective collaborations
		Facilitate collaborative regional planning e.g. via the Southern Gobi Regional Development Council	Adoption of common standards and actions for biodiversity conservation across the region Reduced impacts on population connectivity of wild ungulates and bustards	
	Strong enabling mechanisms established	Establish long-term financing mechanism	Funding to resource ongoing management of the Offsets Landscape in perpetuity	Stakeholders agree on financing mechanism
		Implement a Stakeholder Engagement Plan	Stakeholders aware of OT's biodiversity offset objectives and actions	
	Monitoring and evaluation informs adaptive management	Design and implement M&E system to quantify losses and gains and feed into adaptive management	Dynamic, results-driven management system improving over time Demonstration of compliance with NPI requirements.	Capture of adequate data is technically feasible
	Sufficient Oyu Tolgoi capacity	Build OT's internal capacity for promoting, managing and implementing the Offsets Strategy	OT technically able to manage most offsets actions in 10-20 years time	OT effectively establishes and invests in its team

4.2 Reduced illegal hunting and collecting

Recommended Activities:

- Implement 5 Mobile Anti-Poaching Units – 3 in the Offsets Landscape and 2 in the Buffer Zone
- Build capacity, resources and networking of government institutions to increase prevention, detection and conviction rates of wildlife crime
- Reduce hunting of Houbara Bustards migrating outside Mongolia

Outcomes:

- Reduction in illegal hunting of protected animals
- Reduction in consumption, trafficking and collection of protected animals
- Reduction in over-harvesting of saxaul and other fuelwood sources
- Increased populations of priority biodiversity features

Assumptions:

- Can achieve reduced demand, as well as supply
- Can recruit staff with charisma and power to enforce law
- Can overcome economic, political and community vested interests

The primary threat to the survival of Asiatic Wild Ass, Argali, Goitered Gazelle and Houbara Bustard is illegal hunting. An estimated 4,500 Asiatic Wild Ass are hunted annually in Mongolia (Wingard & Zahler 2006) out of an estimated total of 17,513-19,309 in Mongolia (Lhagvasuren

2007), which is unsustainable and would lead to the species' extirpation (Moehlman *et al.* 2008). Total numbers of Argali in Mongolia appear to have declined from about 60,000 in 1985 to 13,000-15,000 in 2001 (Amgalanbaatar *et al.* 2002). Hunting levels are less well known for Goitered Gazelle. Houbara Bustard are currently primarily hunted in their non-breeding range outside of Mongolia, where declines in some areas have reached 30% per annum (Tourenq *et al.* 2005). Pratt *et al.* (2004) attributed rising levels of illegal hunting in Mongolia to the rising market value of game animals in Asian markets, coupled with declining standard of living of many Mongolians during the transition to a market economy.

The Mongolian 'Law on Fauna' prohibits hunting of 'very rare' and 'rare' species including Asiatic Wild Ass, Argali, Goitered Gazelle and Houbara Bustard except under licence (Supplementary Technical Information 7.3). Mongolia has also ratified the 'Convention on International Trade of Endangered Species' (CITES) which strictly regulates international trade in Appendix I species including Asiatic Wild Ass, and regulates trade in Appendix II species including Argali and Saker Falcon.

The following priority biodiversity features are predicted to have residual impacts from increasing illegal hunting or collecting by the increased numbers of people moving to the Khanbogd area but not directly employed by the Oyu Tolgoi project:

- Asiatic Wild Ass, Argali, Goitered Gazelle, Great Bustard and Houbara Bustard are hunted illegally for parts, meat and sport
- Argali are hunted legally and illegally for sport
- Saker Falcon are collected legally and illegally for falconry
- Saxaul trees, the key species in Tall Saxaul Forest habitat, are collected largely illegally for firewood and timber (but local subsistence is allowed)

4.2.1 Implement five Mobile Anti-Poaching Units

Mobile Anti Poaching Units (MAPU) is the model used with significant success and recommended by WWF in Mongolia. Based on WWF experience, it is estimated that at least two MAPUs will be needed in the Offsets Landscape but given the crucial importance of their success, the risks in terms of personnel needs, and objections from vested interests, it is suggested that a precautionary approach is taken such that three MAPUs are planned and budgeted for. An additional two MAPUs should be planned and budgeted for the Buffer Zone.

MAPUs are staffed by government employees but should work closely with an independent institution, probably a non-government organisation, which the project would fund directly, as well as with the State Specialised Inspection Agency, border police and other key parties at national level and regional level. The primary focus should be upon illegal hunting of priority biodiversity species (i.e. Asiatic Wild Ass, Argali, Goitered Gazelle, Mongolian Gazelle, Great Bustard and Houbara Bustard). Work should also focus on illegal collecting of Saker Falcon and Tall Saxaul Forest. A limited number of Saker Falcon nestlings are collected annually for export under licence from the national government but it is suspected that higher numbers are illegally collected. Collection of saxaul for domestic firewood is a traditional practice but there are increasing reports of illegal collection for commercial use. MAPUs should be implemented as a package of field and intelligence gathering activities including field patrols, rewards, market patrols, informant networks, hotlines and support to government agencies. Activities will initially follow the basic model and the lessons learned from WWF's MAPUs (Breitenmoser *et al.* 2006) including:

- Agreement with the State Inspection Agency (or Ministry of Nature and Environment) for the Oyu Tolgoi project to supply (possibly via an NGO) technical guidance, equipment and finance, but not direct employment
- Start-up investment including vehicles
- On-going investment of salaries and running costs, including incentives for informants and telecommunications
- Operation through large network of volunteers and informants including local communities, groups, clubs, authorities, local authority rangers, protected area rangers and police, of which informant networks are likely to be the most effective
- Specific work with the Border Guard, police and judiciary
- Increasing awareness of conservation issues and laws, including creative means such as festivals or theatre
- Patrols and investigations in areas with suspected illegal hunting and markets
- Publicity and press exposure
- Support for the judicial process and funds to support prosecution
- Sharing income from fines with informants and local authorities (as already legislated)
- Advance these rewards to maintain motivation if cases are slow to progress through the courts.
- Development of incentives for herders co-existing with biodiversity

Given the potential conflicts with the vested interests of people and institutions complicit in illegal hunting, the MAPUs would need to work closely with Oyu Tolgoi project and independent social scientists to ensure that the communication and implementation of these activities are undertaken in a culturally appropriate manner.

4.2.2 Build capacity, resources and networking of government institutions to increase prevention, detection and conviction rates of wildlife crime

Although the primary activity is to operate through MAPUs, the police, border service, prosecution service and judiciary require support to increase prevention, detection and conviction rates for wildlife crime in the southern Gobi region. The new Environment Department in the National Police Force could be involved, once stakeholder engagement has generated a more detailed needs assessment and plan of action. This support could include training, capacity building and possibly payment for some additional operational costs. Payment of operational costs, if deemed appropriate, would necessarily be done with caution, based on a transparent needs-assessment, through an independent institution, and demanding transparent accountability. Of equal importance is the need to build networks between wildlife crime enforcement agencies.

4.2.3 Reduce hunting of bustards migrating outside Mongolia

The Net Positive Impact forecast (Appendix 5) concludes, precautionarily, that impacts of indirect habitat loss on Houbara Bustard and Great Bustard may not be adequately offset by improved rangeland management. Gains may possibly be generated by improved rangeland management but the impacts of different management on bustard populations are very poorly-known and require research. It is proposed to undertake specific research of Houbara Bustard breeding productivity in habitat under different management regimes at Oyu Tolgoi, probably in the Galba Gobi IBA which supports relatively high populations.

Given the lack of evidence for population gains from rangeland management, a necessary precautionary approach would be to undertake additional offsets for these species. These offsets should reduce hunting when these migratory birds are outside of the Oyu Tolgoi area as this is the primary threat to the individual birds using the Oyu Tolgoi area. Reduction of hunting of Great Bustards could be implemented by supporting a conservation project currently operational for Great Bustards in northern Mongolia, which includes those that migrate through the Oyu Tolgoi area. This could be supplemented by supporting the ongoing satellite tagging research to elucidate the migration routes, period and exact location of migratory stop-offs of Great Bustards in the Offsets Landscape (and hence whether improved rangeland management is creating gains for this species) and to investigate potential mortalities when satellite tags become stationary or lost (and hence better quantify residual losses and external threats).

For Houbara Bustards, there is a significant risk of failure of offsets outside Mongolia owing to the socio-political challenges of working in the countries involved. Most Houbara Bustards breeding in Mongolia and China migrate through Kazakhstan and central Asian states, and winter south to Iran to Pakistan (Combreau *et al.* 2011; Tourenq *et al.* 2004; Judas *et al.* 2006), and most Great Bustards winter in China (M. Kessler *in litt.* 2011; IUCN 2011). Results of satellite telemetry from Houbara Bustards elsewhere in Mongolia has indicated the migration and wintering sites illustrated in Figures 14-18 in the Supplementary Information. The exact migration routes, migration stop-offs and wintering grounds of individual bustards at Oyu Tolgoi is uncertain and should be researched with standardised satellite telemetry.

The primary offset activity for Houbara Bustard would be to initiate actions to reduce the level of hunting on the migration grounds of the Houbara Bustards breeding around Oyu Tolgoi. If this proves too challenging or unsuccessful, the project may also invest in retro-fitting bird flight diverters to powerlines in Houbara Bustard habitat elsewhere in Mongolia (in addition to the retro-fitting planned to offset the impacts of the Oyu Tolgoi powerlines). The budget for this action is precautionarily aligned with a higher budget for retro-fitting enough additional bird flight diverters to generate the required gains.

In summary, activities that could be undertaken to offset impacts of illegal hunting on Great Bustard and Houbara Bustard include:

- Research the breeding productivity of Houbara Bustards in areas with different rangeland management regimes
- Support the satellite tracking of Houbara Bustards to elucidate their migration and causes of mortality
- Initiate actions to reduce hunting on the migratory and/or wintering grounds of Houbara Bustard
- Support the satellite tracking of Great Bustards to elucidate their migration and causes of mortality
- Support the conservation project for Great Bustards in northern Mongolia
- Budget for retro-fitting additional powerlines in Mongolia

4.3 Improved rangeland management

Recommended Activities:

- Support herders to transition to more ecologically sustainable stocking ratios
- Implement conservation incentive scheme to compensate herders for opportunity costs
- Develop an alternative livelihoods programme to assist herders' transition to a more biodiversity-friendly system
- Revitalise soum-level grazing planning to enable strategic decisions about herder entitlements and ecologically appropriate stocking levels, in line with national government policy

Outcomes:

- Reduced degradation of rangeland by livestock leading to improved habitat quality
- Increased population of priority biodiversity features
- Reduced disturbance to wild ungulates
- Increased wild ungulate populations

Assumptions:

- OT able to establish trust and facilitate transparent conflict resolution around probable tensions between livelihood and conservation objectives
- OT able to reduce these conflicts through its social livelihood programmes
- Capacity can be built in soum administrations

Domestic livestock graze the natural vegetation across almost all of the southern Gobi region, causing some degradation in habitat quality by localised over-grazing and trampling, as well as small-scale infrastructure development and related disturbance to wildlife (i.e. wells, fences, vehicle tracks, shelters, and feed or cropland production; Sheehy *et al.* 2010). Many priority biodiversity species occur at lower population densities in degraded habitat. Restoring habitat quality through improved rangeland management could generate gains for these species.

The degree of over-grazing across open rangeland is unclear given the many different assessment methods. Moreover, the availability of graze is primarily determined by rainfall rather than livestock numbers, and thus varies between years irrespective of livestock grazing. However, there seems to be a general consensus among herders, government officials, donor institutions, and the public that Mongolian rangeland has been degraded, and continues to degrade, from a combination of livestock overuse and increasing climatic aridity (Sheehy *et al.* 2010). For instance, across 27 plots in Gobi-Altai between 1997-2008, plant species present in 1997 had declined by 33%, grasses and forbs decreased most on winter and summer pastures, vegetation cover and plant litter decreased, and plants preferred by livestock declined on all seasonal pastures (Sheehy *et al.* 2010). The State Inspection and Certification for Pasture Quality of 2010 classified 330 km² as slightly degraded and 14,370 km² as moderately degraded in Khanbogd soum but this conclusion is not universally supported (Damdin 2011). A baseline assessment of livestock and rangeland around the Oyu Tolgoi project site suggested that the area was over-stocked. However, in a different report, about 50% of the rangeland in four bags in Khanbogd soum was considered to be under-grazed because it is too far from water sources for grazing by sheep (Mongolian Society for Rangeland Management 2010). The number of livestock in Khanbogd soum is increasing, especially goats and sheep (Figure 6), however numbers crashed during the 2010 *dzud*. Horses compete for similar foodstuffs as Asiatic Wild Ass, and sheep and cattle compete the least (Sheehy *et al.* 2010). This indicates that returning livestock species ratios towards those maintained by the government collective pre-1990 would most benefit the Asiatic Wild Ass (D. Sheehy *in litt.* 2011).

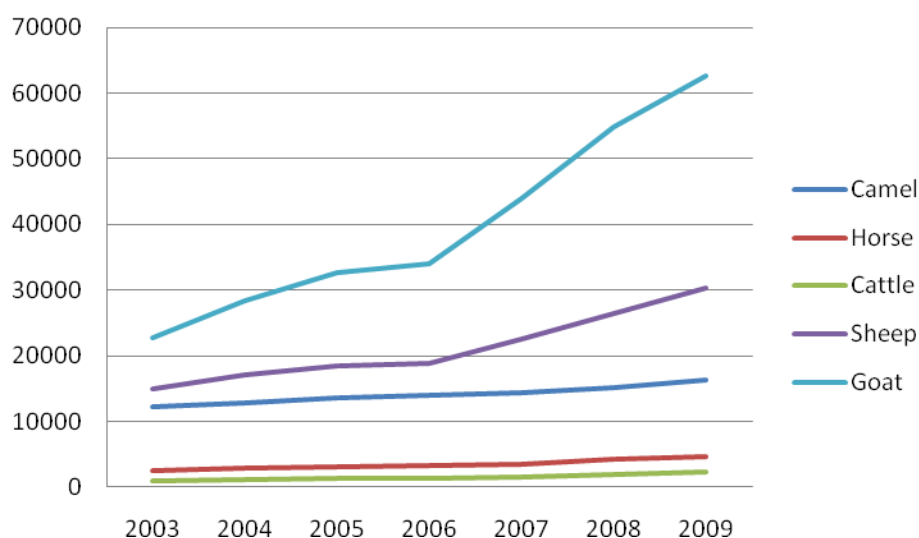


Figure 6: Livestock numbers in Khanbogd soum (Mongolian Society for Range Management 2010)

The majority of the Offsets Landscape has the grazing resources of ‘non-equilibrium’ drier desert, but some is relatively wetter ‘equilibrium’ semi-steppe habitat. Equilibrium grazing systems are characterised by relatively stable climates and constant plant production levels, enabling conventional rangeland management systems which balance grazing pressure with plant growth. Non-equilibrium grazing systems have consistently erratic timing and area of precipitation, which has much greater impacts on vegetation than do grazing impacts. Therefore in non-equilibrium environments, vegetation shows less response to management manipulations, and improvements in rangeland habitat quality are most likely to be achieved in wetter equilibrium habitat. Actions to improve rangeland management should be directed to these habitats since they support more sustained grazing pressure and are more important to both wildlife and livestock during droughts or dzuds (D. Sheehy, M. Fernandez-Gimenez & T. Ulanbayar pers comm. 2011). If monitoring shows that the required gains in habitat quality are not being achieved, the Offsets Landscape may thus have to be extended or shifted to include wetter equilibrium areas to the east.

Reducing competition between herders and wildlife by trying to reduce overall livestock numbers is socially complicated (R. Mearns pers. comm. 2011). It is probably more pragmatic, feasible and beneficial to focus on altering the livestock composition ratios by reducing numbers of goats (which are less selective in what they eat and hence more destructive) and increasing numbers of sheep. Goats have become favoured over sheep because they are better able to survive dzuds and drought (probably because of their greater ability to browse bushes) and perhaps because of wool (cashmere) prices. There is an opportunity to restore the preference for sheep as sheep meat is currently increasing in popularity and national policies such as Mongol Mal encourage reduced goat numbers to address over-grazing and encourage production of quality products.

Competition between livestock and wild animals around the limited water sources is often greater than competition for grazing. Wild ungulates are also often disturbed intentionally and unintentionally by livestock and people away from water sources. Competition is greater during droughts or dzuds. Direct activities are needed to reduce this competition and disturbance. The Offsets Plan could define an absolute limit to the number of old wells or other water sources which can be rehabilitated where there is a clear herder need but low risk of

adverse biodiversity impacts. Such a strategy should clarify that it will not open up any new wells.

Improved rangeland management could be achieved by a range of activities which are discussed in more detail below, including:

- Creation of an assured local market for sheep meat (e.g. the Oyu Tolgoi project buying meat for its employees)
- Provision of husbandry, veterinary and marketing support
- Implement conservation incentive scheme to compensate herders for opportunity costs
- Develop an alternative livelihoods programme to assist herders' transition to a more biodiversity-friendly system
- Revitalise soum-level grazing planning

Many of these actions could best be packaged into a regional biodiversity-friendly business strategy designed during the stakeholder engagement and management planning process. This may include wildlife-friendly grazing plans for various administrative levels, and integration with other regional livestock and business plans. Input would be needed from a multi-disciplinary team with expertise in livelihoods, social enterprise and rangeland ecology. It is emphasised that both conservation and livelihood objectives need to be addressed within a business framework. Activities may include resource use mapping at a bag or khot ail level. The outcome would necessarily be a negotiated 'deal' with local herders that incentivises them to transition to more sustainable biodiversity-friendly operations with decreased overall grazing levels and increased herder incomes.

Given the competition between livestock and wild ungulates for food and water, it is accepted that there is likely to be some potential for conflict between the objectives of rangeland management for biodiversity conservation and traditional livelihoods. A number of steps could be taken to minimise and mitigate this potential conflict. First, all actions should be subject to, and revised through extensive consultation with herders. Second, herders should be given an opportunity to opt out of, or into, these actions during consultations. Third, actions should be aligned where possible with relevant ongoing national and international programmes and initiatives. These include the World Bank's Sustainable Livelihoods Project and the national government's Mongol Mal which aims to prevent over-grazing. Fourth, actions should be focussed on win-win scenarios such as promoting livestock quality over quantity. Fifth, there should be a system of incentives to compensate for losses to any herders incurring opportunity losses through offset actions. Finally, the transition to more biodiversity-friendly livelihoods should be assisted through an alternative livelihoods programme.

Based on comparisons with the German development (GTZ) project which generated 15% relative increase in plant biomass through improved rangeland management (Hess *et al.* 2010), a precautionary estimate is made of half of this (7.5%) improvement in rangeland habitat quality over just 10% of the Offsets Landscape (i.e. assuming it is not politically or technically feasible to implement rangeland management over the whole landscape).

Given these potential conflicts, those responsible for delivery of the improved rangeland management activities would need to work closely with Oyu Tolgoi project and independent social scientists to ensure that the communication and implementation of these activities are undertaken in a culturally appropriate manner.

4.3.1 Support herders to transition to more ecologically sustainable stocking ratios

The Oyu Tolgoi project should buy quality sheep meat for its workforce from local herders. This market should encourage sheep over goats and the production of quality livestock rather than the current trend towards larger numbers of lower-quality livestock. The Oyu Tolgoi project should also address the currently inadequate technical husbandry and veterinary support, supply of good stock, winter forage crops, nutritional supplements and access to markets and organisation of herder communities. Herders preferring to keep some goats should also be encouraged to have lower numbers of better-quality animals as this improves wool (cashmere) yields. The herder community should be encouraged to aim for a 2:1 sheep to goat ratio (D. Sheehy pers. comm. 2011).

4.3.2 Implement conservation incentive scheme to compensate herders for opportunity costs

Community consultation should be undertaken to identify any need to compensate herders incurring costs as they transition to more wildlife-friendly rangeland management. Transitions to more sustainable biodiversity-friendly livelihoods may involve opportunity losses such as reduced livestock numbers, sale of goat wool (cashmere) or tolerance of wild ungulates at water sources and on prime grazing land. Compensation could be given as various conservation incentives including direct payments to households, community payments or non-cash benefits e.g. education or healthcare. There is also a need for an emergency fund to be made available for basic necessities at times of climatic and economic stress. These incentives may also engender a positive attitude to other aspects of the offsets strategy. The conservation incentive system should be designed carefully based on community consultation and learnings from other analogous programmes to avoid the creation of perverse incentives, to avoid raising expectations and to align with all other Oyu Tolgoi project biodiversity and social actions.

4.3.3 Develop an alternative livelihoods programme to assist herders' transition to a more biodiversity-friendly system

The Oyu Tolgoi project should implement an alternative livelihood activities programme to enable sustainable development alongside conservation incentives. Viable alternative livelihood activities should be developed in consultation with local stakeholders and taking account of lessons from analogous development projects. Examples could include financing for environmentally-friendly small and medium enterprise development. The aim here should be to exceed mere compensation for opportunity costs, and ensure a measurable improvement in local livelihoods. It would be critical to link support for all income generating and employment activities directly to conservation.

4.3.4 Revitalise soum-level grazing planning to enable strategic decisions about herder entitlements and ecologically appropriate stocking levels, in line with national government policy

The Oyu Tolgoi project should revitalise existing soum-level grazing planning bodies which are charged with controlling herding at local level, but are usually ineffective. This should be explicitly aligned with government initiatives like Mongol Mal which aim to prevent over-grazing, to provide Mongolian-derived ways of limiting overall stocking levels. This work could potentially be linked to the Pastureland User Groups that the Oyu Tolgoi project social team is establishing, and should definitely work in close conjunction with the afore mentioned groups ensuring that their objectives are fully compatible.

4.4 Reduced impacts of non-project powerlines

Recommended Activities:

- Install best-practice bird flight diverters on non-OT project powerlines

Outcomes:

- Reduced bird collisions with powerlines
Fewer impacts on bustard populations

Assumptions:

- OT able to negotiate installation on non-OT infrastructure

The best like-for-like offset for the residual impacts of bird collisions with the Oyu Tolgoi project's high-voltage transmission lines is mitigation of similar powerlines within areas of similar population densities of susceptible priority biodiversity features elsewhere in the southern Gobi region. Given the lack of baseline data on population densities of Houbara Bustards and other susceptible priority biodiversity features and collision rates around the Oyu Tolgoi powerlines, the residual impacts of collisions cannot be quantified. Instead, the residual impact is expressed as a formula based on a baseline collision rate of y birds/km. Assuming that mitigation is 60% successful, which was the least successful rate in a review of the impacts of powerline mitigations on bustards in South Africa (Jenkins *et al.* 2010), then the residual losses would be $0.4y$ birds/km. The Oyu Tolgoi project is currently planning 95 km of high-voltage transmission lines, meaning an estimated residual loss of $38y$ birds. To offset these losses, similar mitigation should be retrofitted to z km of non-project power transmission lines where $z * 0.6 * y = 38y$, or $z = 64$ km. This assumes a similar population density of priority biodiversity features in the offset area. The Oyu Tolgoi project should monitor either the population density or the collision rate of priority biodiversity species around both the impacted and offset powerlines. If the baseline collision rates and hence offset gains are lower at the offset site, then additional lengths of powerlines will need to be mitigated to ensure a net positive impact.

The offset action would be to install or retro-fit the same mitigation measures used on the Oyu Tolgoi project power transmission lines. These are detailed in Section 6.15 of Appendix 3 (Biodiversity Impacts and Mitigation Actions) and are, in summary, alternating flapper-type flight diverters and large spirals, alternating contrasting colours, at a frequency of at least one of each every 10 - 20 m, i.e. one device at least every 5 -10 m. Slight changes in design may be necessary for different powerline configurations. These will require ongoing maintenance to repair or replace damaged diverters.

It was assessed that the Oyu Tolgoi project low-voltage and medium-voltage power distribution lines would have no significant residual impacts on priority biodiversity features (Appendix 3 Biodiversity Impacts).

The key assumption for this activity is negotiating access to install and maintain diverters on non-project powerlines in areas with similar population densities of priority biodiversity features (notably Houbara Bustards).

4.5 Strengthened Protected Areas

Recommended Activities:

- Implement protected area strengthening for Small Gobi SPA (A & B)
- Review management of Ergeliin Zoo NR and Important Bird Areas, and implement the recommendations as appropriate
- Work with government to review and revise protected area extent and zoning

Outcomes:

- Improved management in existing protected areas
- Improved sustainability of offset actions

Assumptions:

- Protected area agencies willing to work with OT
- Stakeholders support strengthened Protected Areas

The Oyu Tolgoi project is committed to work in the Small Gobi SPA as an offset for the road upgrade to the Gashuun Sukhait border crossing the SPA. The lenders require that *“In circumstances where a proposed project is located within a legally protected area... the client will... implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area”* (International Finance Corporation's Performance Standard 6; European Bank for Reconstruction and Development's Performance Requirement 6).

Mongolian protected areas are, and are likely to continue to be, underfunded. Mongolia has rapidly expanded its protected areas network, but without an increase in the capacity and finances to manage the new reserves (Johnstad & Reading 2003; Reading *et al.* 1999). Recent figures indicated that Mongolia invested only US\$2/km² in protected area management, well below the mean among developing nations of US\$125/km², 194 rangers patrolled the nation's 20.7 million ha of protected areas and one ranger per soum patrolled the rest of the nation (Anonymous 2003 in Reading *et al.* 2006). The Small Gobi SPA has an annual budget of \$20,000 excluding staff costs (Bold pers. comm. 2011). In addition to the work within the Small Gobi SPA mandated by lender requirements, the Oyu Tolgoi project should also look to improve the long-term security of tenure for conservation gains across the whole Offsets Landscape. This includes activities to strengthen the Small Gobi SPA, Ergeliin Zoo Nature Reserve (designated for geological not biodiversity conservation) and the Galba Gobi and the Borzon Gobi Important Bird Areas (which are the only Internationally Recognised Areas identified in the Offsets Landscape). It should also review legal and other opportunities to extend these Protected Areas and improve the long-term security of tenure for conservation gains across the Offsets Landscape.

A specific risk to potential conservation gains won through effective implementation of offset activities is the possibility of current mining exploration leases (which cover most of the Offset Landscape) being converted into actual mine exploration and operation. The key assumptions are that protected area authorities willingly work in partnership with the project to both review and strengthen protected area management, and that stakeholders support strengthening of tenure for conservation. The risk that stakeholders, particularly traditional herders, do not support stronger tenure should be addressed by implementing an ongoing programme of community awareness so that all decisions are based on full knowledge of the short- and long-term implications.

4.5.1 Implement protected area strengthening for Small Gobi SPA (A & B)

The Oyu Tolgoi project is committed to work in the Small Gobi Special Protected Area (SPA) as an offset for the road upgrade to the Gashuun Sukhait border which crosses the SPA Buffer Zone. The primary impacts on the SPA are illegal hunting and over-grazing by domestic livestock. Although established as a protected area, summer grazing camps are authorised and volunteer rangers are remunerated by allowing them to graze livestock within the SPA. A recent study suggested that the SPA could, if allowed, support 176,600 'sheep units' (1 sheep unit = 1 sheep or 1.1 goat or 0.2 camel or 0.17 cow or 0.14 horse) and 153,200 'sheep units' along the state borders, and this grazing opportunity attracts herders from outside Khanbogd soum (Damdin 2011). Any grazing of livestock may lead to exclusion of wild animals such as Asiatic Wild Ass and gazelles. The SPA has a management plan which was reviewed in June 2011 (Bold & Olson *in litt.* 2011). This guides where the project can assist the park authorities to improve its conservation efficacy, including:

- needs assessment of the park and staff
- revise staffing levels, responsibilities and training
- build technical and management skills of staff
- re-zone, including better regulation of livestock grazing
- baseline surveys and monitoring of biodiversity and threats to biodiversity
- reduce illegal hunting and improve rangeland management as conducted outside the Protected Areas
- restore cultural links, traditional knowledge and relevant management practices
- promote tourism
- engage Buffer Zone communities with offsets actions in both Protected Area and wider Offsets Landscape
- pay salaries to volunteer rangers in exchange for them not grazing livestock
- work with Border Guard to help conserve biodiversity in the SPA
- develop sustainable financial income

All activities should be undertaken based on close consultation and partnership with the relevant government authorities.

4.5.2 Review management of Ergeliin Zoo NR and Important Bird Areas, and implement the recommendations as appropriate

The only significant formal protected area in the Offsets Landscape aside from the Small Gobi SPA is the 60,900 ha Ergeliin Zoo Nature Reserve, but this was established primarily for geological, not biodiversity, conservation. Ergeliin Zoo NR may suffer some secondary impacts from the project. The management of Ergeliin Zoo NR for biodiversity conservation should be reviewed and recommendations of these reviews implemented as appropriate. It may not be appropriate to implement recommendations which do not directly contribute to the long-term sustainability of conservation outcomes in the Offsets Landscape.

There are two Internationally Recognised Areas in the Offsets Landscape: the Galba Gobi and Borzon Gobi Important Bird Areas (Batbayar & Natsagdorg 2009). As Important Bird Areas, they have no legal government recognition or protection status. Currently, they have no management plan or management activities. The Oyu Tolgoi project could look to work with the BirdLife International national partner, the Wildlife Science and Conservation Center of Mongolia, to develop management recommendations for the IBAs. Management recommendations should be implemented where they contribute to the long-term

sustainability of conservation outcomes in the Offsets Landscape. Results from monitoring across the Offsets Landscape could also be used to review the boundaries of these Important Bird Areas which are currently based on limited data on abundance of Houbara Bustards as extrapolated from very limited baseline data and topographic surrogates of suitable habitat (A. Tordoff *in litt.* 2011).

4.5.3 Work with government to review protected area extent and zoning, and expand as necessary

The long-term sustainability of the offsets gains would be improved if the tenure or land-use status across the Offsets Landscape was amended to incorporate conservation objectives. Tenure does not need be in the form of formal reserves as such tenure may have limited support from local stakeholders. Alternative models such as community-based local protected areas should be considered. Lessons can be learned from other organisations such as the Snow Leopard Trust which have been working with the Government of Mongolia to establish community-based local protected areas. A full review of options is, however, required as part of the broader offsets management planning process. This review should consider the range of legal opportunities and their stakeholder acceptability.

The zoning and boundaries of formally protected areas, notably the Small Gobi SPA, could be reviewed based on stakeholder consultation to improve its conservation efficacy, notably for sustaining priority biodiversity features. Increased security of tenure is most important for areas that support high populations of priority biodiversity features, notably Asiatic Wild Ass and Houbara Bustard. Expanding Small Gobi SPA B towards the north and east to include more of the core zone of the largest world population of Asiatic Wild Ass may be an effective conservation action if stakeholder support can be generated. Needs and challenges for expansion of the Mongolian protected areas network have recently been reviewed in Chimed-Ochir *et al.* (2010).

4.6 Raised bar in regional development helps sustain gains

Recommended Activities:

- Champion the need for, and benefits of, sustainable and biodiversity-friendly regional development
- Facilitate collaborative regional planning e.g. via the Southern Gobi Regional Development Council

Outcomes:

- Agreement to cooperate
- Adoption of common standards and actions for biodiversity conservation across the region
- Reduced impacts on population connectivity of wild ungulates and bustards

Assumptions:

- Regional stakeholders support regional planning
- OT able to facilitate effective collaborations

Perhaps the greatest risk to the sustainability of biodiversity gains is the impact of potential future development. This is a particular risk for the Khulan or Asiatic Wild Ass which would be susceptible to population fragmentation by poorly-designed roads and to illegal hunting by increased human populations. Given that Asiatic Wild Ass in particular require vast geographical ranges in order to find forage and water in the irregular and extreme climate, any

great losses outside the Offsets Landscape would risk becoming a 'population sink' for animals across the southern Gobi region. In the worst scenario, these losses could lead to the extirpation of this sub-population such that it also becomes lost from the Oyu Tolgoi area despite best-practice conservation around the mine site. This risk should be addressed by the Oyu Tolgoi project 'raising the bar' for the biodiversity conservation standards of new development across the southern Gobi region.

The Oyu Tolgoi project should become the model for infrastructure mitigation best practice, and then it should promote this model. There are few precedents for this approach in Mongolia and the Oyu Tolgoi project would have to innovate and adapt its approaches based on the leadership and ownership of management. The key assumptions are that regional stakeholders, especially governmental institutions, are supportive of improved standards, and that Oyu Tolgoi has the influence and leadership to facilitate effective collaborations.

4.6.1 Champion the need for, and benefits of, sustainable and biodiversity-friendly regional development

The Oyu Tolgoi project should clearly articulate the need for sustainability and biodiversity-friendly principles to be integrated into regional development planning, standards and practices. It should analyse the business case and drivers for both undertaking and leading regional biodiversity-friendly development. It then should champion these standards to ensure long-term sustainability of its biodiversity activities and to benefit from the reputational gains. The Oyu Tolgoi project should consider using the Khulan/Asiatic Wild Ass as a 'flagship' for both sustainable traditional lifestyles and biodiversity conservation (Bowen-Jones & Entwistle 2002) given that traditional herders view the species positively (Sheehy *et al.* 2010) but its conservation requires regional leadership.

4.6.2 Facilitate collaborative regional planning e.g. through the Southern Gobi Regional Development Council

The Oyu Tolgoi project should facilitate the integration of sustainability and biodiversity-friendly principles into regional development. The key is to avoid as many impacts as possible. Unavoidable impacts need best-practice mitigation as implemented at the mine site and championed by the Oyu Tolgoi project. This includes designing and retro-fitting wildlife underpasses under unavoidable roads, installing bird flight diverters on power transmission lines, potentially reducing fencing along railways and actions to combat increases in illegal hunting.

These standards need to be integrated into regional planning through close collaboration with planning and development authorities and forums such as the Southern Gobi Regional Development Council (which may need revitalising). One opportunity for institutionalising higher standards is through strengthening existing EIA procedures.

One activity that would further improve the sustainability of biodiversity gains and generate significant reputational gain would be to facilitate the population connectivity of Asiatic Wild Ass across the Ulaanbaatar-Beijing railway. This would enable animals to move into c.17,000 km² of land east of the railway from which Asiatic Wild Ass have been extirpated. This would also benefit Goitered Gazelle and Mongolian Gazelle which attempt to cross but often become entangled in fences and die. The World Bank is currently investigating the ecological and socio-economic opportunities to remove fences along stretches of the railway. Additional actions might be required to address illegal hunting and other threats east of the railway.

4.7 Strong enabling mechanisms established

Recommended Activities:

- Establish long-term financing mechanism
- Implement a Stakeholder Engagement Plan

Outcomes:

- Funding to resource ongoing management of the Offsets Landscape in perpetuity
- Stakeholders aware of OT's biodiversity offset objectives and actions

Assumptions:

- Stakeholders agree on financing mechanism

A range of supporting activities is needed to ensure effective design, management, implementation and adaptation of the offsets strategy. Two crucial processes are highlighted here: a funding mechanism and stakeholder engagement plan. As detailed in Section 6, the Oyu Tolgoi project will need a long-term financing mechanism to ensure the financial sustainability for its Offsets Programme. The Stakeholder Engagement Plan is discussed in Section 5.

4.8 Monitoring and evaluation informs adaptive management

Recommended Activities:

- Design and implement M&E system to quantify losses and gains and feed into adaptive management

Outcomes:

- Dynamic, results-driven management system improving over time
- Demonstration of compliance with NPI requirements

Assumptions:

- Capture of adequate data is technically feasible

Details of the monitoring and evaluation (M&E) needs are detailed in Appendix 6 (M&E). The M&E should be designed as an integral component of all offsets activities. M&E is needed to quantify the results of offset actions so that losses and gains can be measured and analysed. These results then need to be fed back into the offsets strategy as adaptive management. Adaptive management is a dynamic system of using monitoring results to ensure incremental improvements in offsets activities. Monitoring results are also crucial to measure and demonstrate compliance with the offsets aim of Net Positive Impact.

Monitoring of the offset activities themselves is required as good management practice, as well as monitoring their results. Monitoring should also identify changes in baseline pressures external to the Oyu Tolgoi project which could influence the efficacy of offset activities. For instance, a change in the market for a wild animal product may increase the baseline rate of illegal hunting in the Offsets Landscape.

Examples of monitoring theory and methods are given in Appendix 6 (M&E). For instance, rangeland quality can be monitored remotely via satellite imagery but monitoring Asiatic Wild Ass with enough precision to enable detection of significant changes in population size will require multiple aerial surveys over large geographical areas.

Monitoring and evaluation could be undertaken by an institution independent to the Oyu Tolgoi project, or some components could be contracted-out until sufficient in-house capacity is built. The analysis, conclusions and evaluation need to be subject to independent peer review.

Rio Tinto, in partnership with the IUCN, is developing, testing and implementing an independent process for verification of Rio Tinto's commitment to its NPI objective. As a Rio Tinto managed mining project with high biodiversity values, it is envisaged that in the future, the Oyu Tolgoi M&E process and conclusions would be used to independently verify the project's progress towards NPI.

4.9 Oyu Tolgoi capacity built

Recommended Activities:

- Build OT's internal capacity for promoting, managing and implementing the Offsets Strategy

Outcomes:

- OT technically able to manage most offsets actions in 10-20 years time

Assumptions:

- OT effectively establishes and invests in its team

The Oyu Tolgoi project aspires for as much as possible of the biodiversity offsets work to be managed and implemented 'in-house'. The Oyu Tolgoi project does not wish for the Offsets Plan to be implemented by expatriate staff in external institutions but wishes to build the capacity of its Mongolian staff. While the scope and technical detail of offset-related work outlined in this strategy is beyond the current capacity of the Oyu Tolgoi project biodiversity team, over the long-term in-house skills could be built by working closely with biodiversity partner institutions. In the short- to medium-term, it is recommended that partner institutions are contracted to coordinate and/or deliver some key offset activities. Future capacity can also be built through future transfer of staff from the offsets institution to the Oyu Tolgoi project biodiversity team. Capacity building would be facilitated by biodiversity champions within the company ensuring that Oyu Tolgoi project senior management take ownership of this Biodiversity Offsets Strategy. This is best done by having a senior Oyu Tolgoi manager take full responsibility for achieving Net Positive Impact and compliance with supporting lender demands.

5 Biodiversity Offsets Stakeholder Engagement Plan

The next step for the Offsets Strategy is to engage fully with stakeholders, and to revise the strategy based on their inputs into an Offsets Management Plan. It is anticipated that this engagement will run throughout 2012 and 2013 to align with the current (2011) Oyu Tolgoi Stakeholder Engagement Plan (SEP). Some engagement will need to be continued beyond finalisation of the Offsets Management Plan

Part of this stakeholder engagement plan is a stand-alone Communications Strategy to ensure that the key messages reach the right audiences at the right time. This should generate a broad media outreach and to continue beyond the finalisation of the Offsets Strategy. For example, the Oyu Tolgoi project might want to package its entire biodiversity programme in the southern Gobi region under the banner of 'Khulan / Asiatic Wild Ass conservation'. It may also wish to stress the outcomes of not just environmentally sustainable landscapes but also socially, politically and financially sustainable landscapes, alongside the outcomes of biodiversity conservation.

The next sections identify key stakeholders and summarise important issues for which stakeholder engagement is necessary. These are then synthesised into the Stakeholder Roadmap to outline a proposed schedule for engagement. The issues discussed are those which require co-development with stakeholders or which may cause confusion or conflict if stakeholders are insufficiently engaged. Mechanisms already mentioned in the current (2011) Oyu Tolgoi ESIA Stakeholder Engagement Plan (SEP) are **emboldened** to highlight places where the biodiversity offsets stakeholder engagement plan can be integrated with the overall ESIA SEP. The issues discussion and Stakeholder Roadmap follow a similar stakeholder classification to that in the broader ESIA SEP.

This Biodiversity Offsets Stakeholder Engagement Plan should be revised by the Oyu Tolgoi project biodiversity and social teams to incorporate ongoing developments and revised thinking.

5.1 Stakeholder Map

In alignment with the overall SEP, the following stakeholder categories and target groups are identified:

Affected parties:

- Herder households
- Soum residents, businesses and local government
- Oyu Tolgoi workforce

Interested parties:

- Ministry of Nature, Environment and Tourism (MNET)
- Ministry of Food and Agriculture (MFA)
- Ministry of Roads, Transportation, Construction and Urban Development (MRTCUD)
- Border Protection Agency (part of Ministry of Defence)
- State Specialised Inspection Agency (SSIA)
- Ministry of Mines and Energy (MME)
- Ministry of Justice and Internal Affairs (including the national police agency)
- Southern Gobi Regional Development Council (and other regional institutions e.g. South Gobi Homeland Committee)

- Aimag governments (various departments)
- Soum governments (various departments)
- Oyu Tolgoi project communities and social performance teams
- Industry associations and other business representatives
- International NGOs and scientific community
- National NGOs and scientific community
- Community Based Organisations (especially Pasture User Groups and alternative livelihood groups)
- Legal hunter groups (e.g. Mongolian Professional Hunters Society)
- Media organisations

5.2 Stakeholder issues

The issues discussed below are those which either need stakeholder engagement to feed into development of the Offsets Management Plan or which may cause confusion or conflict if stakeholders are insufficiently engaged.

5.2.1 Biodiversity offsets

Many stakeholders will be unfamiliar with the concepts of biodiversity offsets. Key points that need to be communicated include that they are the last step in the mitigation hierarchy; they compensate for residual impacts to biodiversity that cannot be mitigated onsite; and they are additional conservation actions beyond those already being done by others. Stakeholders with a basic knowledge of offsets need to understand the differences from standard Mongolian legal environmental obligations, the requirements of the project lenders and the Oyu Tolgoi project's own voluntary corporate policies.

Stakeholders also need to know the basic governance and accountability structure of the offsets actions, and that progress towards NPI will be independently monitored and evaluated. Similarly, nearly all stakeholders will have heard of the Oyu Tolgoi project. It is important to know whether they have any misconceptions and what views and opinions they hold. This baseline information may be collected by other Oyu Tolgoi project initiatives.

For some or many stakeholders it may be most appropriate to talk of the offsets programme as one promoting a type of 'sustainable landscape' in which mining, local herder livelihoods and biodiversity conservation can all co-exist. The communication and understanding of the project amongst government and community stakeholders would be the critical first step in appropriate structuring of the ownership of the programme with key dependants within Mongolia.

5.2.2. Illegal hunting

The activities to reduce illegal hunting require relatively little co-development with local stakeholders but do require extensive discussion with national government institutions, WWF, the MAPUs operated by WWF and the communities benefiting from MAPU work. Reducing illegal hunting in the Offsets Landscape and Buffer Zone would cause some conflicts with the economic, political and community vested interests which partake in or benefit from illegal hunting. Their perspectives would help in the design and implementation of these activities. Ongoing implementation would require extensive ongoing consultation and awareness at all levels. The whole population should be made aware of the need to enforce hunting laws and the consequences of non-enforcement. Enforcement activities would require co-development and collaboration with the Ministry of Nature, Environment, and Tourism, State Specialised

Inspection Agency, Border Guard, national police and judiciary. Long-term public events, outreach and education at multiple levels are needed. Successful convictions should be publicised by the media as a deterrent.

The development of activities to address hunting of bustards migrating outside of Mongolia would require extensive discussion with international NGOs and scientific community.

5.2.3 Rangeland management

It is accepted that there is likely to be some potential for conflict between the objectives of rangeland management for biodiversity conservation and traditional livelihoods. An explicit recognition of this potential conflict and the steps proposed to minimise and mitigate this potential conflict need to be clearly communicated and then discussed. Participation in the opportunities offered by the offsets activities, to enable more sustainable herder livelihoods, should be equitably negotiated. Such consultations will take time, requiring small teams of local communicators engaging in resource-use mapping, and potentially establishing mediation committees to address concerns that may arise around grazing restrictions, and negotiate solutions.

The Oyu Tolgoi Stakeholder Engagement Plan notes that the Oyu Tolgoi project and the Mongolian Society for Range Management (MSRM) plan to establish a **Pasture NGO and User Groups** of “herders within different *khot ail* to work collaboratively on pastureland management and preservation’ in Khanbogd soum. Biodiversity offset objectives need to be integrated into this work, which could provide a model for scaling up across the broader offsets area. This is likely to be a complex process that would require use of a combination of Oyu Tolgoi’s engagement tools including **community visioning and agreements, focus discussions and workshops**, and **local community** (bagh dhural) **meetings**.

Other key stakeholders include the Ministry of Food and Agriculture (MFA) which may have relevant future agricultural strategies such as privatisation, fencing and market mechanisms to favour ecologically sustainable livestock ratios and levels. Local governments, especially soums, would be required to participate in the offset activities, notably grazing planning.

5.2.4 Alternative livelihoods

Community needs and aspirations for alternative livelihoods need to be discussed and considered for the Offsets Plan. Alignment and synergies need to be sought with the Oyu Tolgoi project’s existing **community development programme**.

5.2.5 Sustainable financing

The establishment of a sustainable financing mechanism for long-term offset implementation, possibly an endowment-based trust fund, would require engagement with various national government ministries. Delivery mechanisms for distributing this money would need to be co-designed with the parties participating in improved rangeland management activities.

5.2.6 Infrastructure mitigation

Offsetting through retrofitting bird flight diverters to non-project powerlines would require negotiation with powerline owners, operators, managers and government. The project would also need to lead on facilitating mitigation of impacts of other infrastructure including roads and railways.

5.2.7 Strengthened Protected Areas

All actions in formal Protected Areas require collaboration and engagement with MNET and park authorities. Planning and implementing activities requires engagement with neighbouring communities. Oyu Tolgoi should also engage with non-government organisations such as BirdLife International's national partner the Wildlife Science and Conservation Center of Mongolia, to develop management actions for the Galba Gobi and Borzon Gobi Important Bird Areas.

5.2.8 Regional planning

The need for the Oyu Tolgoi project to champion and lead raised standards for sustainable biodiversity-friendly regional development should be clearly communicated to relevant stakeholders. The Oyu Tolgoi project would need to engage and work with the **Southern Gobi Development Council (SGDC)** and/or similar relevant agencies e.g. the South Gobi Homeland Committee. The SGDC apparently "includes senior civil servants of the relevant departments of key Ministries as well as representatives from Oyu Tolgoi LLC, other mining companies in the region and civil society" (Oyu Tolgoi 2011). The Oyu Tolgoi project would need to ensure that biodiversity is mainstreamed into the regional development strategy by building SGDC's technical awareness by broadening its membership or adding a Technical Advisory Committee, and communicating with decision-makers in Ulaanbaatar via SGDC's **update and briefing sessions**.

5.3 Stakeholder engagement road map

Stakeholder category & target group	Detailed engagement through discussion of main elements of draft Offset Plan							
	Biodiversity offsets	Infrastructure mitigation	Rangeland management	Alternative livelihoods	Illegal hunting	Sustainable financing	Regional planning	Strengthened Protected Areas
AFFECTED PARTIES (<i>agreement on offset design; some joint decision-making; information sharing</i>)								
Herder households								
Initial engagement								
Ongoing engagement								
Soum residents, businesses and local government								
Initial engagement								
Ongoing engagement								
Oyu Tolgoi workforce								
Initial engagement								
Ongoing engagement								
INTERESTED PARTIES (<i>consultation, joint decision-making and implementation partners</i>)								
Ministry of Nature, Environment, and Tourism (MNET)								
Preliminary engagement in 2011								
Initial engagement								
Ongoing engagement								
Ministry of Food & Agriculture (MFA)								
Initial engagement								
Ongoing engagement								
Ministry of Roads, Transportation, Construction and Urban Development (MRTCUD)								
Initial engagement								
Ongoing engagement								

*The Biodiversity Consultancy Ltd and Fauna & Flora International –
Biodiversity offsets strategy for the Oyu Tolgoi project – December 2011*

Stakeholder category & target group	Detailed engagement through discussion of main elements of draft Offset Plan							
	Biodiversity offsets	Infrastructure mitigation	Rangeland management	Alternative livelihoods	Illegal hunting	Sustainable financing	Regional planning	Strengthened Protected Areas
Border Protection Agency								
Initial engagement								
Ongoing engagement								
State Specialised Inspection Agency [SSIA]								
Initial engagement								
Ongoing engagement								
Ministry of Mines & Energy (MME)								
Initial engagement								
Ongoing engagement								
Ministry of Justice and Internal Affairs								
Initial engagement								
Ongoing engagement								
Southern Gobi Regional Development Council								
Initial engagement								
Ongoing engagement								
Aimag, and then Soum, government								
Initial engagement								
Ongoing engagement								
Oyu Tolgoi Communities & Social Performance Team								
Initial engagement								
Ongoing engagement								

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Biodiversity offsets strategy for the Oyu Tolgoi project – December 2011*

Stakeholder category & target group	Detailed engagement through discussion of main elements of draft Offset Plan							
	Biodiversity offsets	Infrastructure mitigation	Rangeland management	Alternative livelihoods	Illegal hunting	Sustainable financing	Regional planning	Strengthened Protected Areas
Industry associations								
Initial engagement								
Ongoing engagement								
International NGOs & scientific community								
Preliminary engagement in 2011								
Initial engagement								
Ongoing engagement								
National NGOs and scientific community								
Preliminary engagement in 2011								
Initial engagement								
Ongoing engagement								
Community Based Organisations								
Initial engagement								
Ongoing engagement								
Legal hunter groups, e.g. Mongolian Professional Hunters Society								
Initial engagement								
Ongoing engagement								
Media								
Initial engagement								
Ongoing engagement								

6 Financing

An indicative budget has been prepared, but many costs are extremely approximate and dependent on the results of stakeholder engagement, contractors' budgets to undertake the monitoring and evaluation work, and the ongoing adaptive management feedback from monitoring and evaluation. Therefore, no budget is presented here. However, ongoing costs are estimated to be approximately US\$3 million / year (approximately equal costs for reduced illegal hunting, improved rangeland management, M&E, and management and other costs combined), and start-up and short/medium-term costs totalling an additional approximately US\$8 million. This indicates that endowment of a trust fund to finance the Oyu Tolgoi project Biodiversity Offsets Strategy into perpetuity would be in the order of US\$70 million.

Offset gains need to be maintained in perpetuity through continual management. Funding such management is best guaranteed by up-front capitalisation of a long-term financing mechanism to provide stable, predictable and sustainable financing. Rio Tinto's experience in financing long-term sustainable development initiatives around other existing operations has clearly demonstrated that the most cost-effective and secure way to fund long-term management actions is through establishing an endowment (IUCN 2007). More than 50 conservation trust funds have been established in developing countries globally during the last 20 years, managing a total of over \$1.5 billion (Spergel & Wells 2009). Almost all conservation trust funds are independent legal entities and, owing to the requirements of international donors, have governing boards made up of representatives of public and private sectors and civil society. Such funds often offer low transaction costs (most larger conservation trust funds have administrative costs of 10-12%), openness, transparency, flexibility, credibility with a broad array of national as well as international stakeholders, and have proven very effective if insulated from excessive government influence (Spergel 2011). Other overarching governance principles include ensuring that financial structures and payments are independent from the Oyu Tolgoi project itself, decisions and transactions are fully transparent, minutes and transactions are fully disclosed to the public, and technical decisions are made by a committee including national and international experts. These principles need to be considered when determining details of the administration and management of a financing mechanism.

It is worth noting that there is a precedent for a Mongolian trust fund, the Mongolian Conservation Trust Fund (METF⁴) which the Ministry of Nature, Environment and Tourism (MNET) tried to establish in 1997. METF's lack of success was due to international funding pledges not materialising, largely as a result of not hiring professional fundraisers (Markandya 2010).

Mitigation actions will be financed from the Oyu Tolgoi project's operational budget and will continue up to closure and post-closure as necessary. The financing mechanism for any mitigation actions post-closure may depend on the actions themselves and has not currently been determined.

⁴ METF was developed to hold its capital investment off-shore, with a separate Mongolian account for disbursement; its governance structure comprised a nine-member Board of Directors with representatives from the Mongolian government, NGOs, academic sector plus international donors; a Scientific and Technical Advisory Committee was to advise on the feasibility and environmental impact of proposed projects; and a Financial Advisory Committee was to advise the Board on all matters relating to national and international compliance.

7 Risks to achieving Net Positive Impact

7.1 Uncertainty

There are large uncertainties in the estimates underpinning the NPI forecast, notably in the baseline estimates of key biodiversity features and their pressures, and the lack of models enabling accurate estimation of the gains predicted from the chosen offset actions. Thus, the Oyu Tolgoi project should aim to exceed the likely minimum requirements by a large margin to be confident of achieving NPI. This should be coupled with intensive monitoring and evaluation to refine the estimates of these uncertainties and to inform adaptive management of the whole Offsets Strategy.

A number of hydrogeological uncertainties are highlighted in Appendix 3 (Biodiversity Impacts and Mitigation Actions). If monitoring shows hydrological connectivity between various aquifers, then additional impacts are likely and additional offsets would be needed.

7.2 Socio-political risks

The Oyu Tolgoi project recognises the potential risk posed if there is a lack of ownership from senior management and/or lack of financial and human resourcing for the Offsets Plan. Although the COO has ultimate responsibility for ensuring the overall outcome of Net Positive Impact (and hence compliance with PS6 / PR6), the Oyu Tolgoi project will also need to ensure adequate staffing and resourcing at lower levels to ensure achievement of these outcomes.

The offset activities risk being negated by poor standards of development elsewhere in the Offsets Landscape and even elsewhere in the southern Gobi region. The Oyu Tolgoi project should seek to address this risk by championing and facilitating a raised bar in standards for regional development.

A related risk is the threat to long-term sustainability of the offsets gains by inadequate long-term security of land tenure including existing mining and oil exploration leases. The Oyu Tolgoi project should work with stakeholders to investigate and implement opportunities to improve the security of tenure for biodiversity outcomes across the Offsets Landscape and indeed the southern Gobi region.

The potential for conflict between traditional herder attitudes and biodiversity-friendly rangeland management has been highlighted and a number of offsets activities have been developed specifically to ensure that herders benefit significantly if they wish to opt into the package of changes and benefits.

Herders' likely wish for greater provision of water (e.g. boreholes) would risk increased degradation of rangeland and disturbance in areas currently able to support lower livestock densities. It is recommended that the Oyu Tolgoi project defines an absolute limit to rehabilitating old wells where there is a clear herder need but low risk of adverse biodiversity impacts, and not open up any new wells.

The risk of additional herders immigrating into the Offsets Landscape to exploit the package of offsets benefits will need to be addressed in the design of the final Offsets Management Plan, including defining which herder groups have rights to the lands based on resource-use mapping.

Demand for products of illegal hunting is largely dependent upon external influences such as the market for products used in Chinese traditional medicine. The Oyu Tolgoi project should monitor these non-project pressures, to establish solid collaborations with external agencies and to continue to improve awareness of the issues and the consequences of uncontrolled illegal activities.

The Oyu Tolgoi project's ability to champion and lead raised standards of regional development would be compromised by any significant delays in implementation of best-practice mitigation to its own infrastructure.

7.3 Technical risks

It is understood that 'non-equilibrium' habitats across most of the offset landscape may be ecologically unresponsive to improved rangeland management (D. Sheehy *pers. comm.* 2011). If the necessary biodiversity outcomes are not generated in these habitats, the Offsets Landscape may need to be extended to wetter 'equilibrium' habitats to the east.

In the short-term, extreme weather events may reverse biodiversity gains and socio-political support. In the long-term, climate change may cause similar disruption. The Oyu Tolgoi project should mitigate these risks by aiming to generate significant contingencies in biodiversity gains, especially connectivity across large landscapes, and socio-political support.

8 Recommendations

As discussed above, to begin to implement biodiversity offsets and manage the associated risks, the Oyu Tolgoi project should:

- Implement the stakeholder engagement plan and convert this Offsets Strategy into an Offsets Plan
- Aim to exceed the likely minimum requirements by a large margin to be confident of achieving NPI (if extra offsets outcomes are verifiably achieved, these could even be traded as ‘biodiversity credits’.) This is best achieved by a combination of precautionary measures including:
- Research legal and other opportunities for ensuring long-term security of offset gains
- Investigate opportunities for liaison and partnership with other projects developing infrastructure and considering offsets in the southern Gobi region (e.g. The Nature Conservancy's Development by Design project)
- Ensure collaboration between environmental and social teams so that the objectives and actions for mitigation actions for local communities are consistent with the objectives and actions for biodiversity mitigation and offsets
- Ensure adequate staffing and resourcing at lower levels for delivering the overall outcome of Net Positive Impact (and hence compliance with PS6 / PR6)

9 Supplementary Technical Information:

9.1 Detailed distribution of some priority biodiversity features in the Offsets Landscape

This section provides some more detailed technical information on the distribution of some priority biodiversity features, and how these data were used in offset site selection and project design. The occurrence of priority biodiversity features addressed by the offsets strategy at each potential offset site is summarised in Table 3. It is acknowledged that there are inadequate baseline data. This should be addressed by specific monitoring and evaluation and by liaison with parallel processes such as The Nature Conservancy's Development by Design project.

The Khulan or Asiatic Wild Ass has been highlighted as a potential 'flagship' species given the global importance of the southern Gobi region to this rapidly declining Endangered species and the large predicted residual impacts of the Oyu Tolgoi project. This species formerly had an extensive range across central Asia from the Arabian Peninsula to Mongolia, but the southern Gobi region now holds about 50% of its current total global population (Figure 7; Moehlman *et al.* 2008; Appendix 2). No other priority biodiversity feature has its global range or population so concentrated in the Oyu Tolgoi project's area of influence. Based on field surveys (e.g. Figures 8-10), there is a zone of high Asiatic Wild Ass population density across an extensive area of the south-eastern Gobi. Largest numbers occur in south-western Dornogovi/eastern Omnogovi where 11,187 individuals (95% confidence intervals = 4,012-31,196) were estimated in 2009 (out of a total of 7,799-38,163 estimated in the whole of Mongolia, with about 73% of the additional animals in the Great Gobi B SPA; Lkhagvasuren *et al.* 2010). However, it should be noted that this is a nomadic species, moving in response to food availability, and its geographical distribution thus varies by hundreds of kilometres over months and years. Its distribution in the southern Gobi region should be monitored by the project.

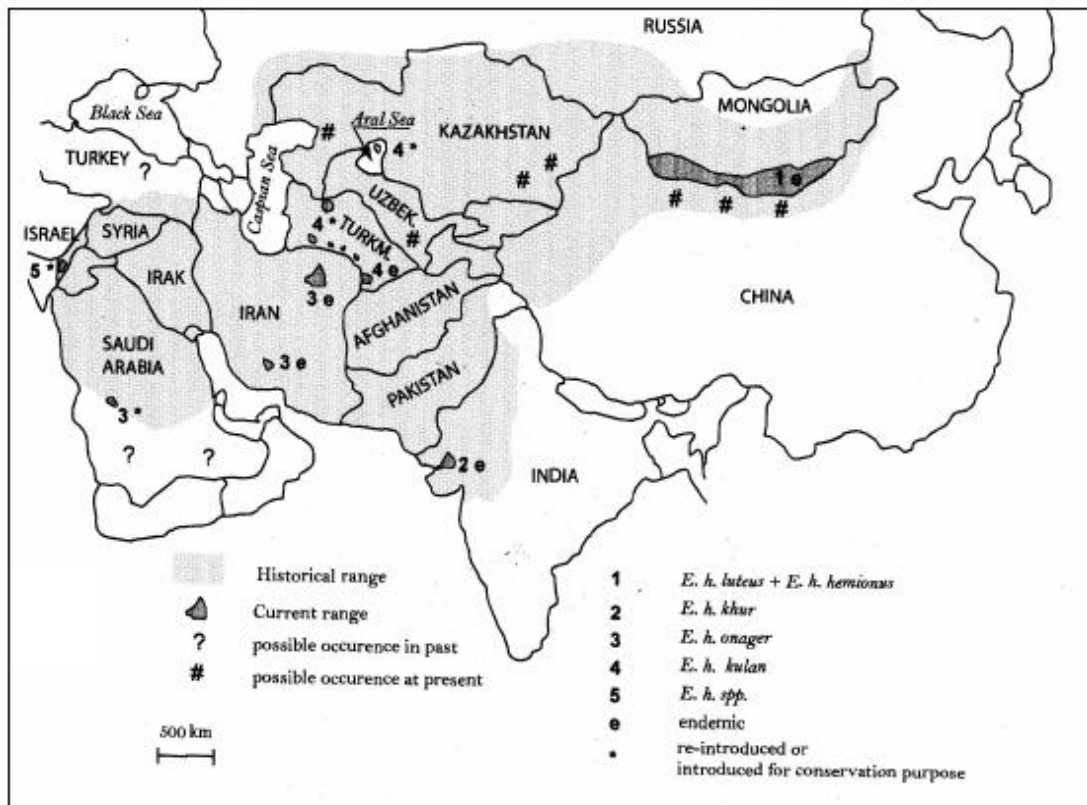


Figure 7: Historic and current global range of Asiatic Wild Ass (from Feh et al. 2002)

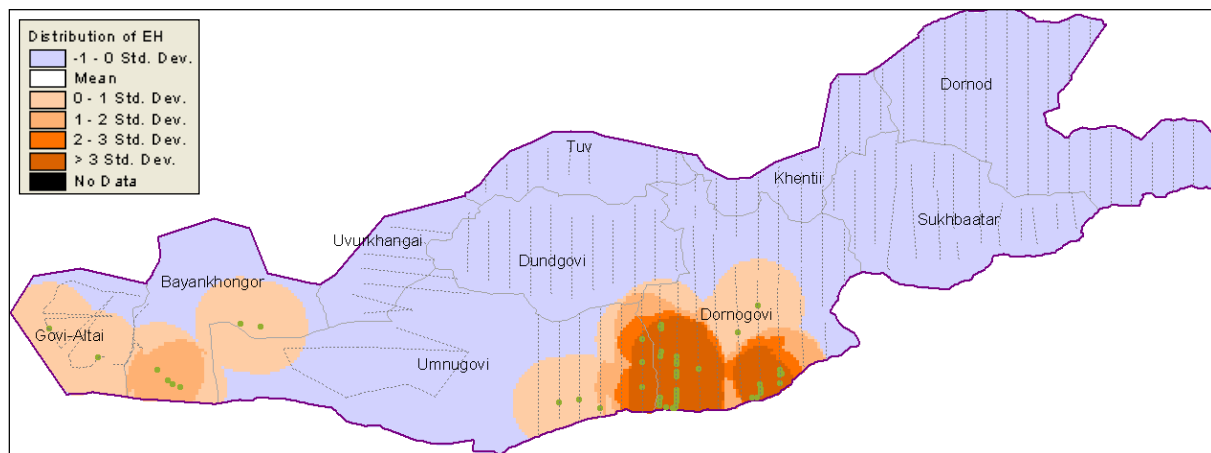


Figure 8: Asiatic Wild Ass recorded in 2009 surveys, showing estimated population density and survey transects (Lkhagvasuren et al. 2010)

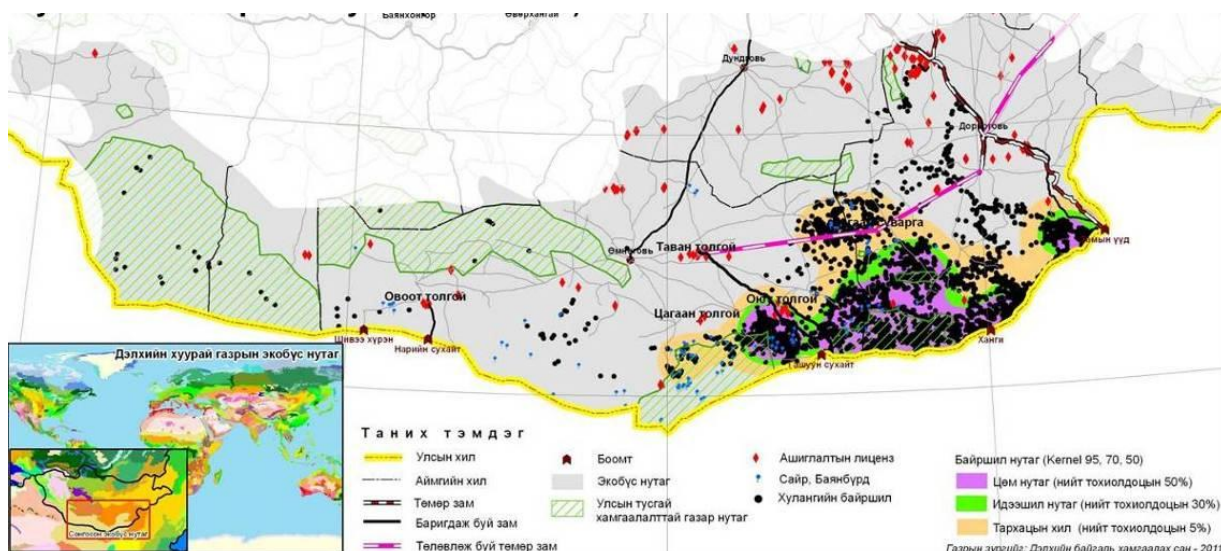


Figure 9: Asiatic Wild Ass recorded 2003-2010, showing estimated population density

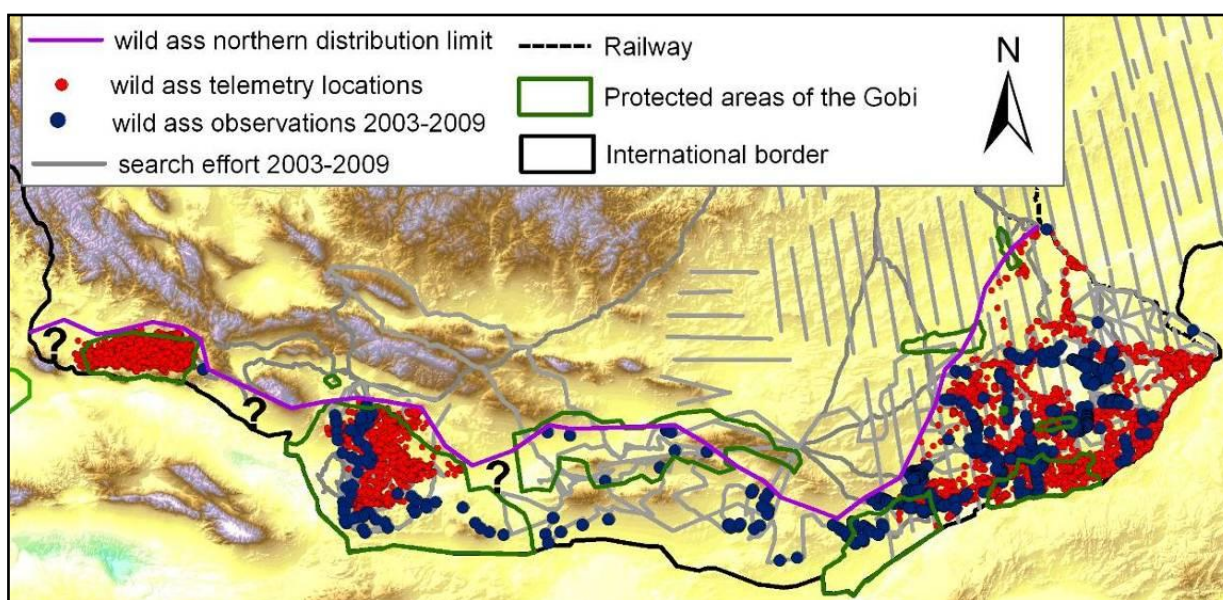
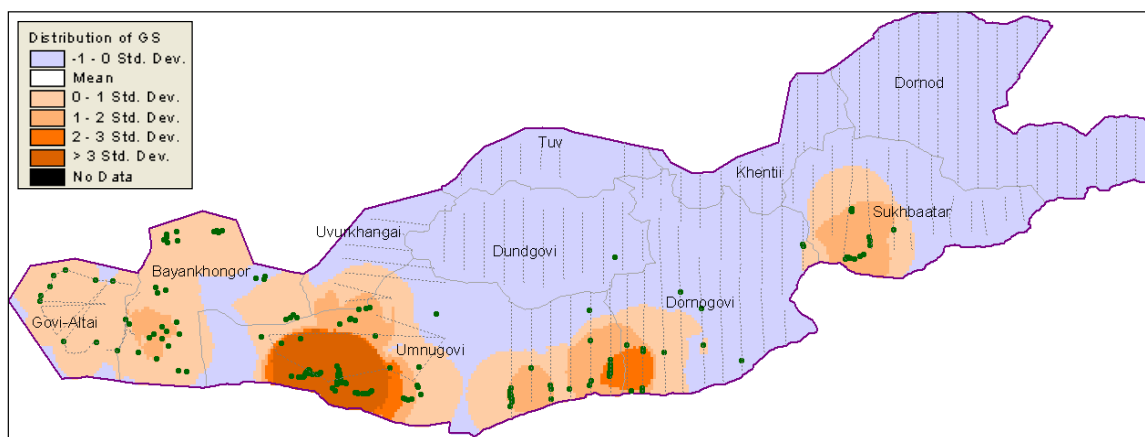


Figure 10: Asiatic Wild Ass observations and telemetry locations (Kaczensky et al. 2011) in the South Gobi

Note that the high-density area in the south-east Gobi is defined here as the Offsets Buffer Zone. This could be extended to include the higher-rainfall region to the north which supports habitat more suited to Asiatic Wild Ass but from which they have become recently extirpated. However, the reasons for extirpation need to be investigated and addressed before attempting to encourage them into this area. Similarly, another extension could be to the c.17,000 km² east of the Ulaanbaatar – Beijing railway from which Asiatic Wild Ass have become recently extirpated. This would require removal of sections of fence (if authorities were open to such actions; a subject being currently investigated by the World Bank) and addressing any other reasons for extirpation from this area. Enabling crossing this railway would also benefit Goitered and Mongolian Gazelle and reduce the mortality currently caused by animals attempting to cross but becoming entangled in fences.

- Goitered Gazelle are also found over much of the southern Gobi region with moderate numbers occurring in south-western Dornogovi/eastern Omnogovi where 5,103 individuals (95% confidence intervals = 2,027-12,849) were estimated in 2009 (out of a total of 6,458-25,035 estimated in the whole of Mongolia; Lkhagvasuren *et al.* 2010). However, it should again be noted that this is a nomadic species – moving in response to food availability – and its geographical distribution thus varies by hundreds of kilometres over months and years. Ongoing fieldwork would be needed to assess numbers using any potential offset areas.



*Figure 11: Goitered Gazelle recorded in 2009 surveys, showing estimated population density and survey transects (Lkhagvasuren *et al.* 2010)*

- Mongolian Gazelle are found in small numbers over some of the southern Gobi region where 1,124 individuals (95% confidence intervals = 654-1,931) were estimated in 2009 in south-western Dornogovi/eastern Omnogovi (out of a total of 3.3-9.8 million estimated in the whole of Mongolia (Lkhagvasuren *et al.* 2010).
- Argali are restricted to hilly areas. Surveys of Argali in the southern Gobi region indicate that they occur in significant numbers. In 1997, an estimate of 3,900 ($\pm 1,132$ standard error) was made in Dundgovi, Omnogovi and Dornogovi (Reading *et al.* 1997) and in 2009, an estimate (within 95% confidence limits) of 1,361-4,967 Argali was made in Dornogovi, 1,505-15,408 in Dundgovi and 1,198-4,852 in Omnogovi (Lkhagvasuren *et al.* 2010). Its occurrence and abundance in the chosen suite of offset sites should be confirmed by discussion with national Argali experts.
- Swan Goose, Ferruginous Duck, Great Bustard, Relict Gull and Yellow-breasted Bunting are migrant birds, occurring in small numbers in transit between northern breeding and southern non-breeding areas, and can be reasonably assumed to occur in similar numbers across any proposed offset areas.
- Within Mongolia, Short-toed Snake-eagle is uncommon or rare and essentially restricted to Khanbogd, Nomgon, Bayan-Ovoo, and Khurmen soums (N. Batbayar *in litt.* in Appendix 2).
- Egyptian Vulture is dependent on rocky areas for nesting. Fieldwork is needed to assess its baseline distribution in the area of influence of the Oyu Tolgoi project, from where there are very few records, its estimated residual loss, and its occurrence in any proposed offset areas.

- Saker Falcon is likely to be widespread where there are adequate numbers of small and medium-sized mammals for prey and trees or cliffs for nesting, is known to be widespread in the Galbyn Gobi region and to range across the southern Gobi region (Batbayar *et al.* 2011) and can be reasonably assumed to be widespread across any proposed offset areas.
- Houbara Bustard probably breeds in much of the area containing the candidate offset sites (draft Red List for birds per G. Sundev *in litt.* 2011 in Appendix 2). It is dependent on shrub-lands in desert and semi-desert area (Tourenq *et al.* 2004). The only recent data from the southern Gobi region are from a survey in the Galba Gobi Important Bird Area, which indicated the species' occurrence throughout the area surveyed, including north to the mine site and Khanbogd town (Figure 12; Batbayar *et al.* 2011) and fieldwork for the Oyu Tolgoi project which recorded the species south-west of the mine site and near the Small Gobi SPA (Tseweenmyadag 2011).

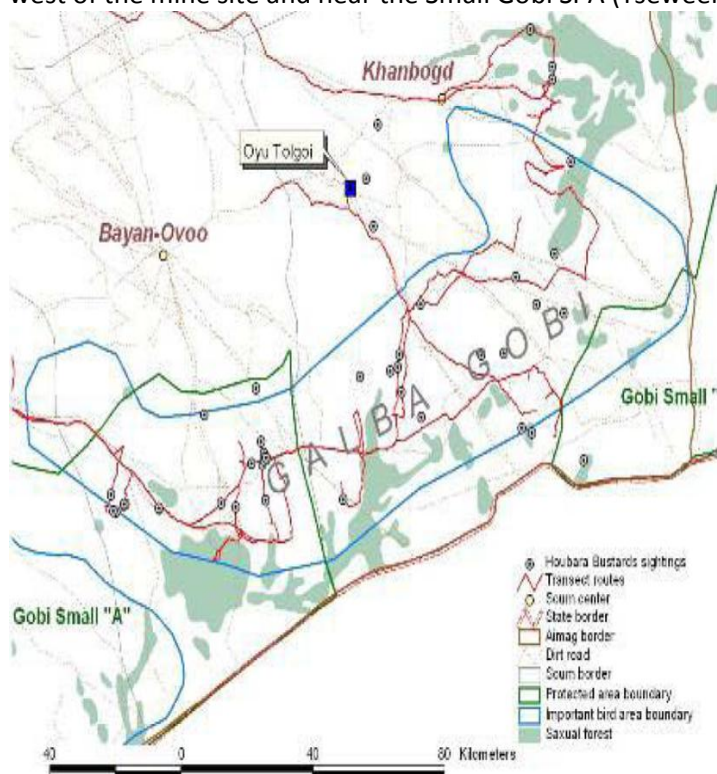


Figure 12: Records of Houbara Bustard in Galba Gobi Important Bird Area (Batbayar *et al.* 2011).

- Pallas' Sandgrouse and Mongolian Ground-jay are common species throughout the Galba Gobi (Batbayar *et al.* 2011) and can be reasonably assumed to be widespread across the proposed regional offset areas.
- Mongolian Chesney has a range across southern Mongolia but is most abundant in the south-east (around the project area). Fieldwork is needed to assess its baseline distribution in the area of influence of the Oyu Tolgoi project, its estimated residual loss, and its occurrence in any proposed offset areas. This is true of all 18 'very rare' plants known or predicted to occur in the project area.
- Riverine Elm Trees now have a significant portion of their range confined to the unit of analysis comprising Khanbogd, Manlai and Bayan-Ovoo soums and the Small Gobi SPA, and the distribution to the east and south has now been much reduced by anthropogenic pressures (H. von Wehrden *in litt.* in Appendix 2). As Riverine Elms Trees

have a very patchy distribution (see mapped distribution within Khanbogd soum; Figure 12), fieldwork would be needed to assess the abundance and quality of this feature in any offsets. Riverine Elm Trees may not occur in significant quantities in candidate offset areas to the east, but significant potential exists for propagating and planting new trees.

- Ephemeral Lakes and Pools are an extremely rare feature in the arid south of Mongolia, yet South Gobi contains several large and important ephemeral lakes and pools, most in Small Gobi B SPA, but also in Small Gobi A SPA and less frequently in Galbyn Gobi (H. von Wehrden *in litt.* in Appendix 2).
- Although saxaul is widespread in the southern Gobi region (46% of the Mongolian total is in Omnogovi and 6% in Dornogovi; NSO & MNE 2000 in Crisp *et al.* 2004), the unit of analysis comprising Khanbogd, Manlai and Bayan-Ovoo soums and the Small Gobi SPA contains extreme and very unusual examples of the habitat, with exceptionally high and broad trees (H. von Wehrden *in litt.* in Appendix 2), identified here as the feature Tall Saxaul Forest. As saxaul occurrence is patchy and its quality variable (see mapped distribution within Khanbogd soum; Figure 13), fieldwork would be needed to assess the quality as well as distribution of this feature in any offset, and it may not occur in significant quantities in offsets outside of this unit of analysis.

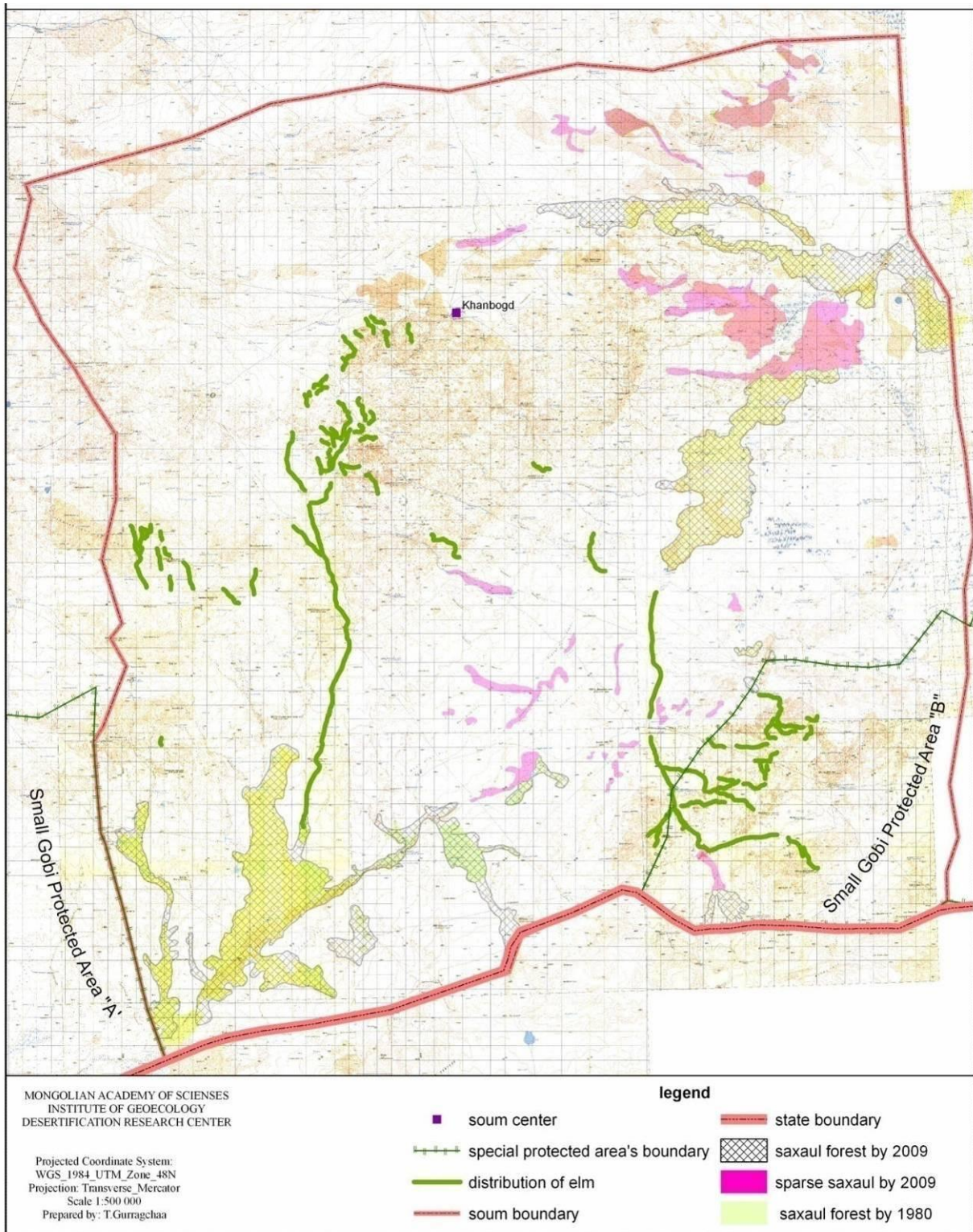


Figure 13: Distribution of elm trees and saxaul forest in 2009 (legend for saxaul forest in 1980 and 2009 may need transposing)

9.2 Migration routes and wintering grounds of Houbara Bustards

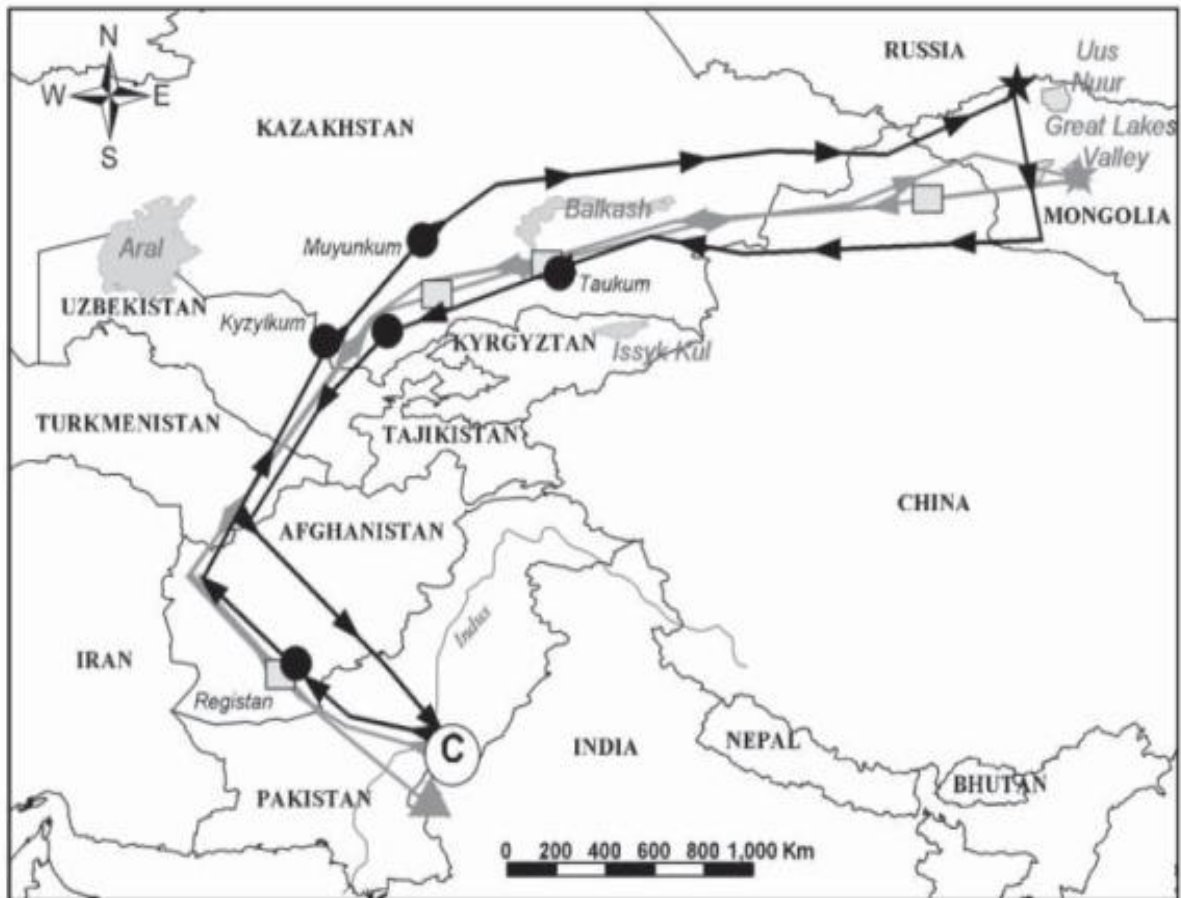


Figure 14: Migration routes of two Houbara Bustards, showing breeding sites (stars), long stop-overs (circles and squares) and wintering sites (C) (Tourenq et al. 2004)

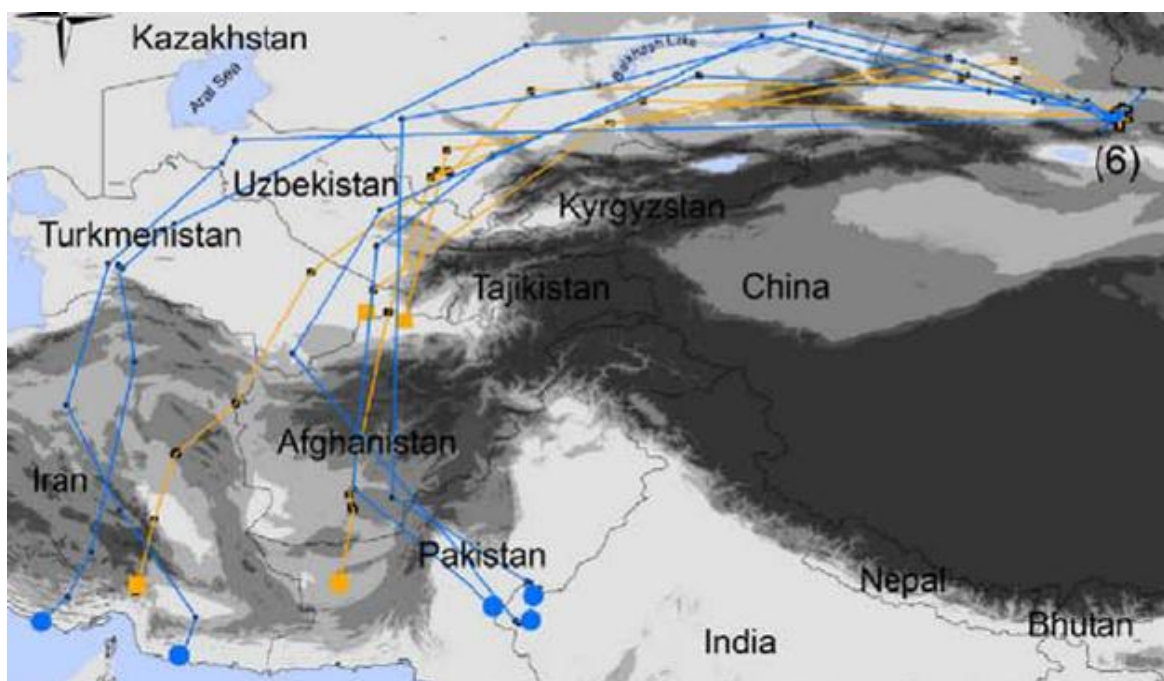


Figure 15: Migration routes of Houbara Bustards from the East Jungar Basin of Xinjiang, China. Males in orange, females in blue and altitude shaded (Combreau et al. 2011)

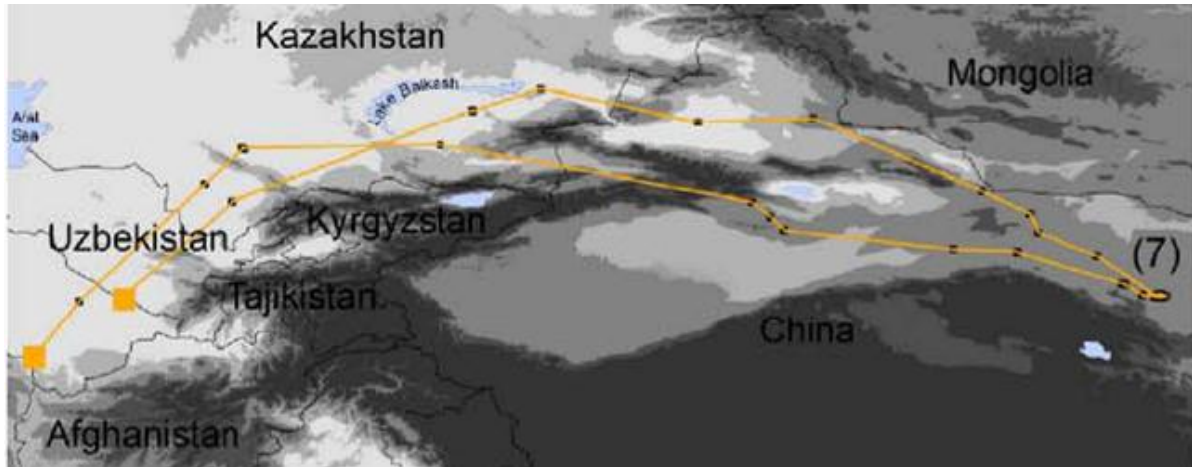


Figure 16: Migration routes of two male Houbara Bustards from the south-west Gobi of Gansu, China; altitude shaded (Combreau et al. 2011)

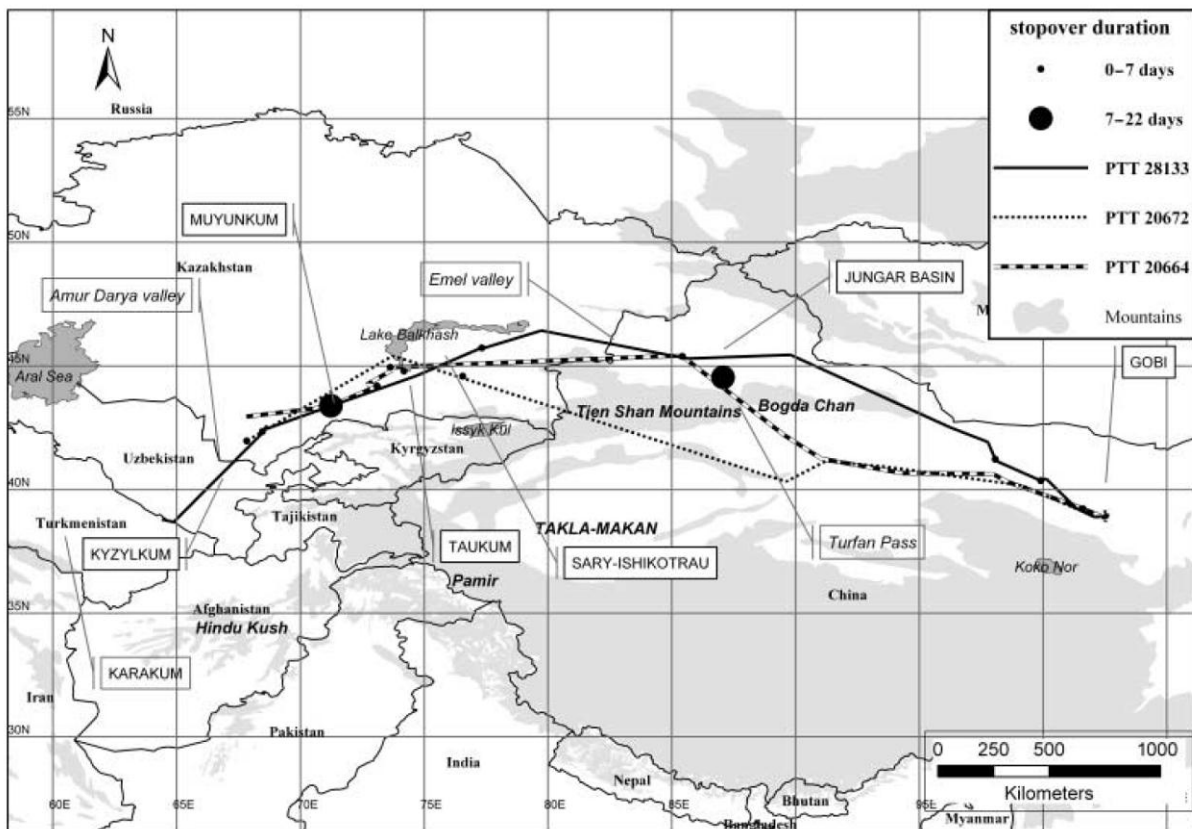


Figure 17: Migration routes of three male Houbara Bustards from the Gobi desert, China; altitude shaded (Judas et al. 2006)

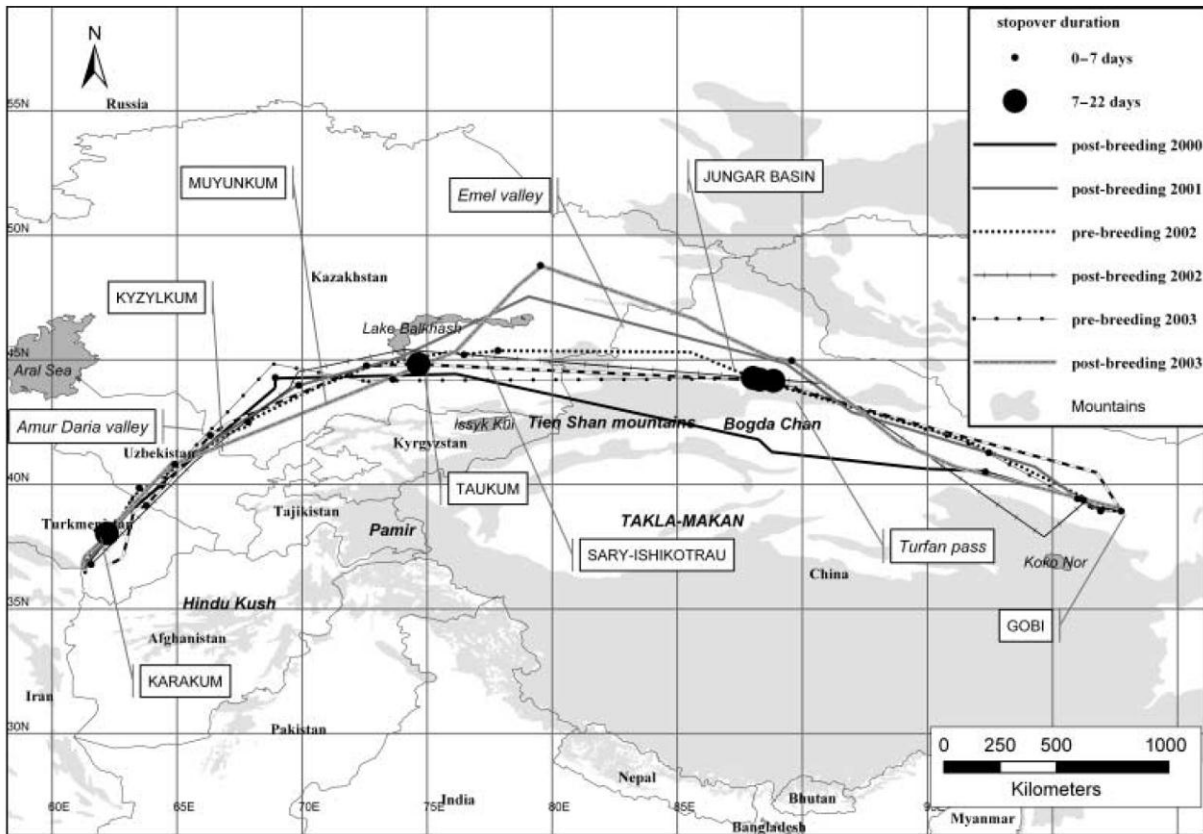


Figure 18: Migration routes of three male Houbara Bustards from the Gobi desert, China; altitude shaded (Judas et al. 2006)

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