

centerra**GOLD**



Biodiversity Management Strategy and Plan

Version: 20 December 2012



Approved By:

Michael Fischer, President _____

Date: _____

Kumtor Operating Company

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Photo credits (cover page, clockwise): Snow leopard trap camera picture provided by FFI / Panthera; mine site, argali (Marco Polo sheep) and petroglyphs from KOC; map and livestock from Ak Shyrak provided by Prizma.

Abbreviations

AER	Annual Environmental Report	PCR	Parliamentary Commission Report
BE	Biodiversity Enhancement	KBRC	Kumtor Biodiversity Research Center
BEP	Biodiversity Enhancement Portfolio	KGC	Kumtor Gold Company
BMSP	Biodiversity Management Strategic Plan	KOC	Kumtor Operating Company
BMY	Balykchy Marshaling Yard	KR	Kyrgyz Republic
Bpy	Before present year	Kumtor	KOC or KGC
CBD	Convention on Biological Diversity	LEAD	Leadership for Environment and Development
CCP	Conceptual Closure Plan	LLC	Limited Liability Company
CDP	Carbon Disclosure Project	LOM	Life of Mine
Centerra	Centerra Gold Inc.	MAC	Mining Association of Canada-
CITES	Convention on International Trade of Endangered Species	Masl	meters above sea level
CSR	Corporate Social Responsibility	Mbs	meters below surface
EBRD	European Bank for Reconstruction & Development	mg/l	milligrams per liter
EHS	Environment, Health & Safety	MOU	Memorandum of Understanding
EIA	Environmental Impact Assessment	MP	Management Plan
EMAP	Environmental Management Action Plan	NAS	National Academy of Science of KR
EMS	Environmental Management System	NGO	Non-governmental Organization
FFI	Fauna and Flora International	PS	IFC Performance Standard
GIIP	Good International Industry Practice	Prizma	Prizma LLC
GIS	Geographical Information System	RLC	Regional Liaison Committee
Ha	Hectares	SCER	Sarychat Ertash Reserve (<i>Zapovednik</i>)
ICMM	International Council on Mining and Metals	SCEZ	Sarychat Ertash <i>Zapovednik</i>
ICR	Interagency Commission Report	SOE	State Owned Enterprise
IFC	International Finance Corporation	UN	United Nations
ISLT	International Snow Leopard Trust	UNFCCC	UN Framework Convention on Climate Change
IUCN	International Union for the Conservation of Nature	UNDP	United Nations Development Program
		WWF	World Wildlife Fund
		Zapovednik	Reserve or Nature Reserve

1 Executive Summary

1.1 Biodiversity Policy

Kumtor is committed to contributing to the protection and conservation of biodiversity, including the application of integrated approaches to land-use planning throughout the mining lifecycle in line with Good International Industry Practice. Kumtor also recognizes the need for and value of dialogue with local stakeholders, and to reduce or eliminate significant impacts on biodiversity and ecosystem services. Where feasible, Kumtor also seeks to identify opportunities to enhance and improve local ecosystems and related economic development.

1.2 Background

Centerra Gold Inc.'s (Centerra) Kumtor Project is the largest gold mine operated in Central Asia by a Western-based company. Approximately 33% of Centerra Gold's shares (listed on the Toronto Stock Exchange) are owned by Kyrgyzaltan, a Kyrgyz state-owned enterprise. Kumtor is an open pit mine and has been producing gold since 1997. Kumtor's current Life of Mine (LOM) is 2026.

KOC invited Prizma LLC (Prizma) to support the development of this Biodiversity Management Strategy and Plan (BMSP). As part of this process, Prizma facilitated a biodiversity focus group meeting (workshop) in Bishkek in October 2012. A summary of the meeting is contained in Appendix 3. Prizma's experts had previously visited the Kumtor mine site numerous times. Prizma also conducted a site visit to the Sarychat Ertash Nature Reserve (SCER), so-called "hunting camps" (also referred as "hunting farms") and Kumtor's exploration license areas. Prizma also discussed draft versions of this BMSP with Kumtor and Centerra Gold. These activities and input helped shape this BMSP.

1.3 Regional biodiversity context

The Kumtor mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated Tien Shan region. This region features a number of rare and endangered species, which are detailed further in this report, including the endangered snow leopard. The Kyrgyz Government established the Sarychat Ertash Nature Reserve (SCER), a *Zapovednik*¹, adjacent to the Kumtor project in 1995. The SCER also serves as a 'core' for the UNESCO Issyk-Kul Biosphere Reserve, which was established in 2001. Large areas have also been designated as hunting areas and several of these surround the SCER and overlap with the planned Buffer Zones and Kumtor's former exploration license areas. The latest and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic is dated 2008, which is expected to be updated in 2013.

¹ *Zapovednik* describes a "Protected Area - sacred, protected from disturbance, committed to heritage" intended to be kept "forever wild", originating in Soviet era where strong restrictions limit access to scientific research, education and management activities. Historically, no tourism has been allowed in most *Zapovedniks* and this restriction continues today in Kyrgyzstan.

1.4 Brief History

Kumtor, along with its multilateral lenders, have been involved in a number of collaborative, grant-funded and conservation-oriented projects. These have been largely supported, developed or implemented by national and international non-governmental organizations (NGOs), local communities, staff of the SCER and other experts.

This process started with the review of Kumtor's EIA by the International Snow Leopard Trust in 1995 on behalf of multilateral lenders. This resulted in Kumtor's adoption of no-hunting policies and support for conservation NGO-lead capacity building and monitoring programs. Over the past 15 years, grant-funded and NGO/expert-supported studies and surveys associated with Kumtor and the SCER have generated relatively large amounts of biodiversity baseline and monitoring information which, probably, exceed the information available from all other Kyrgyz *Zapovedniks*.

The results of these studies have confirmed that issues such as poaching and lack of institutional support have been, and continue to be, the main risks and barriers to broader wildlife biodiversity conservation. The data also confirms a substantial rebound (increase) in numbers of snow leopards, Ibex and Marco Polo sheep (argali). However, more recently, some stakeholders have raised concerns about Kumtor's exploration activities within the context of so called "Buffer Zones" to the SCER, and potential impact on certain flora.

There appears to be some misinformation as to the exact boundaries, size and legal standing of these "Buffer Zones". The Kumtor Concession predates the establishment of the SCER by the KR government. The size of the SCER is well defined and does not include any designated buffer zones. However, in 1999 a Resolution of the regional Jety-Oguz District Administration established a "Buffer Zone" to the SCER. To date, this designation has not been approved by the KR government, as required by KR Law 182. This issue is expected to be addressed in the 2013 revision of the KR National Biodiversity Plan. However, the presence and location of these "Buffer Zones" (and related issues) do not seem to relate to material biodiversity risk and impacts, as also confirmed during the October 2012 biodiversity stakeholder workshop.

In the long term, the projected Climate Change effects to regional biodiversity of Central Asia, which exhibits the characteristics of island biogeography, are expected to be dramatic. In Kyrgyzstan, up to 95% of glaciers are expected to disappear by the end of this century and boundaries of ecosystems (for example, the tree lines) are expected to shift significantly.²

1.5 Biodiversity Management Strategy and Plan (BMSP)

Kumtor has identified the need to develop this formalized BMSP for three main reasons. First, Kumtor plans to further integrate the aspect of biodiversity into its Environmental Management System (EMS) and Conceptual Closure Plans (CCP) in line with its corporate policies and evolving Good International Industry Practice (GIIP). Second, Kumtor views biodiversity conservation and related enhancements as

² Forrest, Jessica, L. et al. Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation*, 150: (2012) 129-135.

important leadership and stewardship opportunities to exceed its corporate 'zero harm goal' and, if feasible, generate net-positive sustainability outcomes. This will provide an opportunity to move from compliance oriented approach towards generating broader biodiversity additionality (biodiversity enhancement and upside). This approach is also expected to innovate the mining sector and its approach to biodiversity conservation in the Kyrgyz Republic. Third, a more structured program is expected to facilitate collaboration and communication with conservation partners and other stakeholders interested in Kumtor's biodiversity impacts.

The key components of the Kumtor's BMSP identified at this time include three work-streams. First, updating Kumtor's environmental and closure policies, systems, plans and reporting to further integrate (mainstream) biodiversity aspects. Second, conclude a multi-year partnership through a Memorandum of Understanding (MOU) and related funding commitment with an international conservation NGO active in Kyrgyzstan. Third, through this partnership, support and co-finance the validation and implementation of the SCER's (Draft) Management Plan and related and/or broader research and monitoring programs. This includes plans for a seamless integration of Kumtor's obligatory biodiversity related studies and monitoring with those of the SCER's annual work/action plans. Kumtor will also pursue Biodiversity Enhancement (BE) opportunities and a related portfolio of projects and programs to promote net-positive biodiversity actions have been identified and presented in this document.

Subject to support by the Kyrgyz Government, Kumtor's medium and long term elements of the BMSP are expected to increasingly focus on leveraging the outcomes of its partnership and research activities to collaboratively develop a sustainable post-closure land use strategy that might include biodiversity, ecosystem services, Climate Change research and eco-tourism.

1.6 BMSP Structure

This BMSP contains eight Sections. Following this Executive Summary, the regional biodiversity context and cultural heritage issues are summarized in Sections 2 and 3, respectively. Section 4 describes the key stakeholders and Appendix 3 contains the summary of the biodiversity focus group meeting conducted on 19 October 2012 in Bishkek. Kumtor's Biodiversity Management Strategy and Plan are contained in Sections 5 and 6, respectively. These cover also partnership and communication. A proposed Biodiversity Enhancement portfolio is presented in Section 7. Key references used are provided in Section 8.

1.7 Contact

Kumtor welcomes your comments and questions about this BMSP and all related activities. Please direct your communication by email to environment@kumtor.com.

2 Regional Biodiversity Context

2.1 Kumtor's Land Use

Centerra Gold Inc.'s (Centerra) Kumtor Project is the largest gold mine operated in Central Asia by a Western-based company. Approximately 33% of Centerra Gold's shares (listed on the Toronto Stock Exchange) are owned by Kyrgyzaltan, a Kyrgyz stated-owned enterprise. Kumtor is an open pit mine and has been producing gold since 1997. Prior to its development, the Kumtor project was subject to an Environmental Impact Assessment (risk assessment), an *'Expertisa Review'* by the Kyrgyz regulatory authorities, and due diligence by international lenders (including EBRD, IFC and EDC). Kumtor's current Life of Mine (LOM) has been recently expanded to 2026.

The Kumtor Mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated region. The general location of Kumtor is shown in Figure 1. The Kumtor's Concession, the SCER and planned buffer zones are depicted in Figure 2. Until mid-2012, the Kumtor Operating Company maintained two exploration licenses which are also depicted in Figure 2. These comprised the Karasay License (125 km²) and the Koendy (Koenduu) License (134 km²). The Kyrgyz Government rescinding these exploration licenses in mid-2012. KGC's exploration license areas overlap other land use designations, including planned "buffer zones" to the SCER. The relevant ecosystems are summarized further below. The Kumtor Concession and the SCER are surrounded by designated hunting areas, known as hunting camps or farms. These are depicted in Figure 3.

The operation is supplied from a marshaling yard located in the industrial center of the city of Balykshy on the western edge of Lake Issyk-Kul. Trucks deliver their goods via paved roads along the southern shores of Lake Issyk-Kul, where, near the village of Barskaun (or Barskoon), Kumtor's trucks exit the paved road and move along a technical (gravel) road for about 95 km along the Barskaun and Arabel rivers through the Barskaun valley and pass to reach the mountain valley plateau leading further up to the mine site.

2.2 Regulatory Context

The latest (2008) and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic was prepared for submission to the Convention Secretariat on Biodiversity. This report details also the legal basis for biodiversity conservations and relevant International Conventions and Agreements. These are reproduced in Appendix 1 and Appendix 2, respectively. The KR State Agency of Environment Protection and Forestry Management plans to update the National Report of Biodiversity of the Kyrgyz Republic in 2013. This effort is being supported with funding from UNEP.

Figure 1: General location map of the Kumtor Mine in the Kyrgyz Republic



Figure 2: Location of Kumtor Concession, exploration licenses, SCER and planned buffer zones

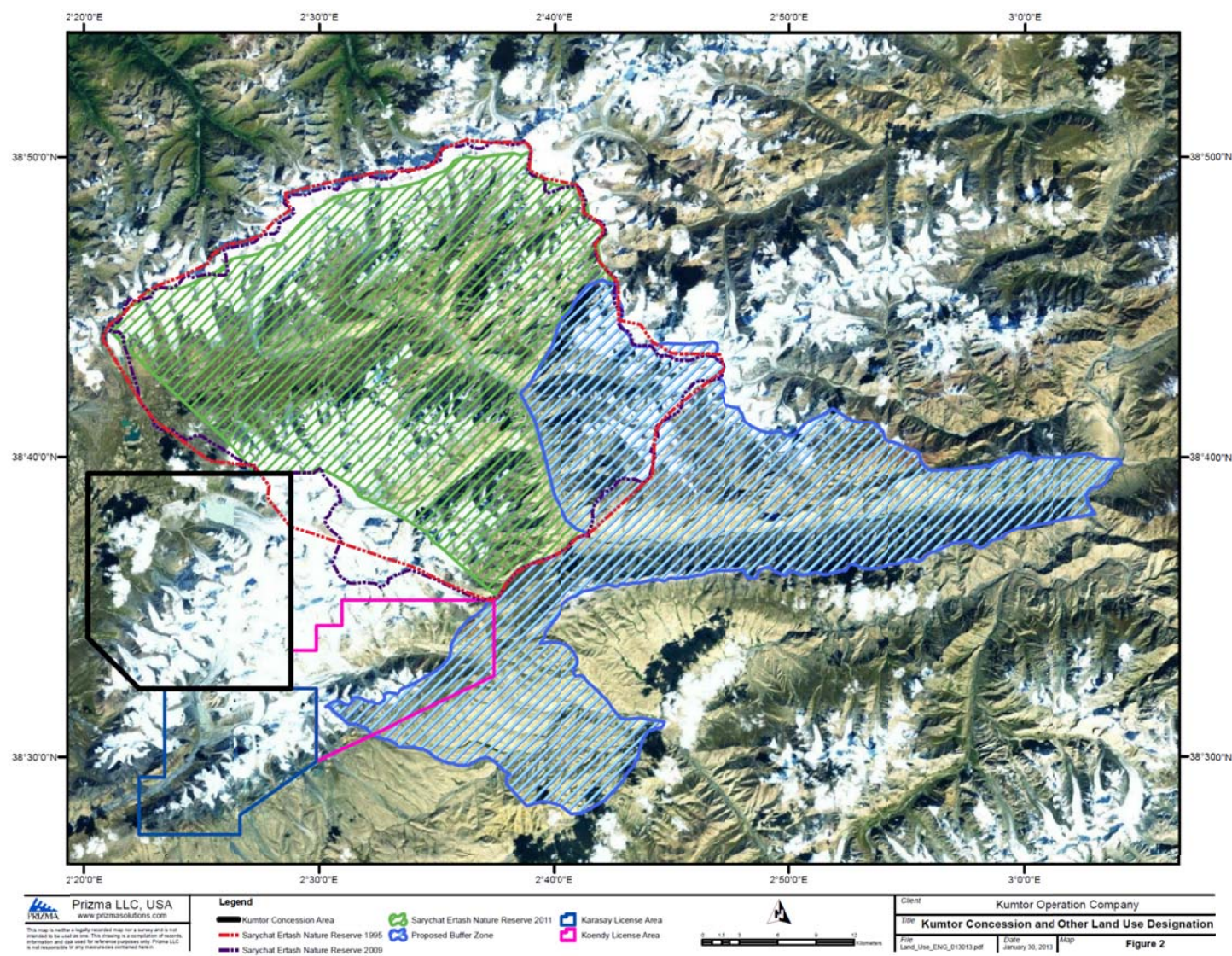
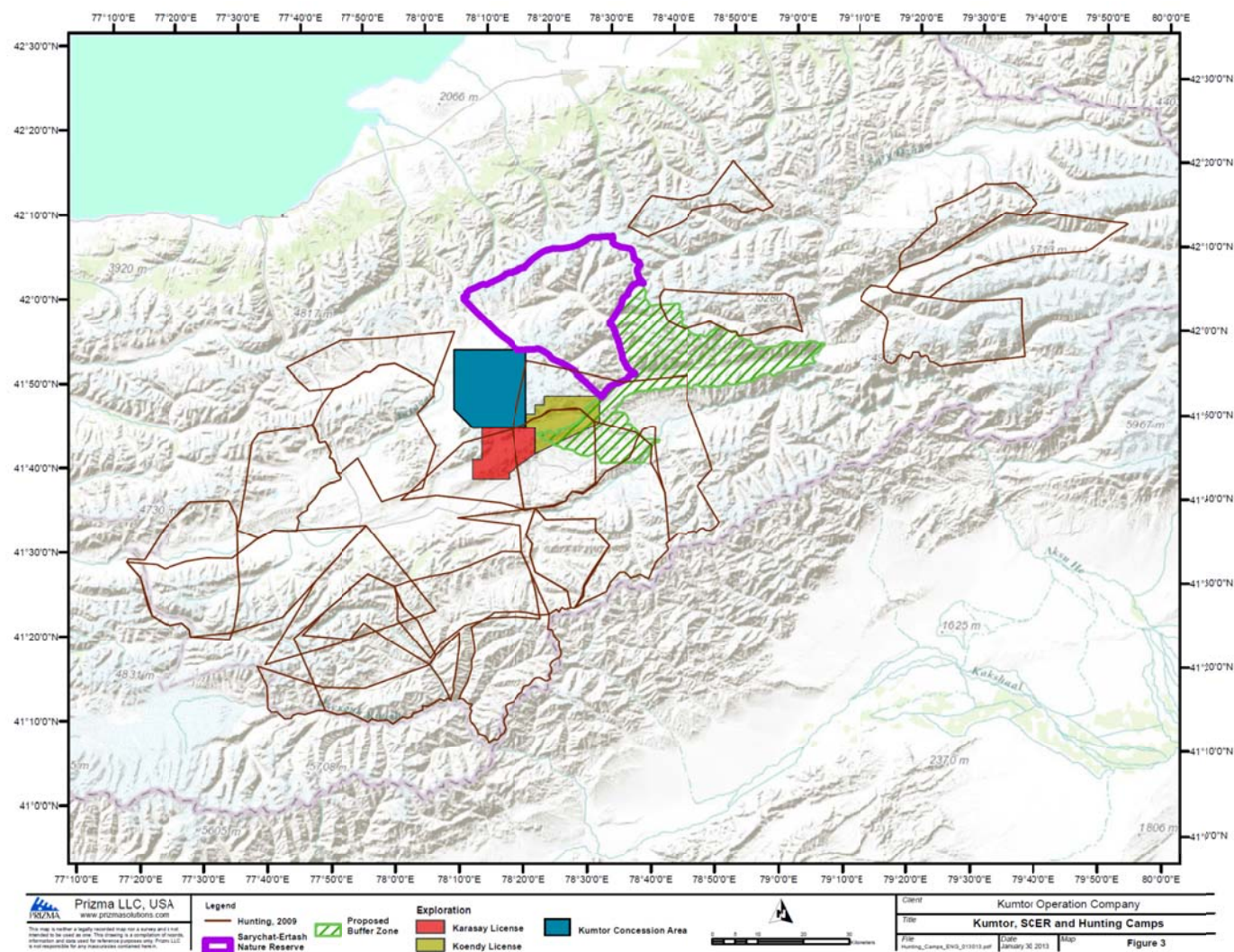


Figure 3: Location of Kumtor, Exploration License Area, SCER and designated hunting areas



2.3 Kumtor and the Sarychat Ertash Reserve

Prior to the onset of the Kumtor Concession and the Kumtor Mine there was no formally protected area. There was, however, a study area to justify establishment of a mountain nature reserve at the junction of the Central and Inner Tien Shan Mountains, when Kyrgyzstan was still a Republic of the USSR.

The EIA generated for the Kumtor operation in 1993 had identified the presence of a number of “Kyrgyz Red Book” and IUCN listed species (meaning species considered to be Vulnerable, Threatened, Rare and/or Endangered), adding to earlier Soviet research of the region. A dedicated review by the International Snow Leopard Trust (ISLT) on behalf of multilateral lenders had confirmed that mining activities *per se*, if combined with no hunting policies and other responsible mining practice, were not believed to be posing a material risk to the regional wildlife biodiversity. Instead, the NGO review identified, *inter alia*, overgrazing in the high altitude meadows, related and unrelated poaching (high-value species for trophy hunting, traditional medicinal markets and retaliation killing), and lack of sufficient resources to support conservation efforts as the main biodiversity risks in the region.

This triggered efforts by Kumtor, international lenders and the Kyrgyz Government to formally establish the SCER, which was achieved by Government Decree in 1995. Also, Kumtor – along with other stakeholders such as the EBRD, IFC, FFI and ISLT - were able to directly support conservation initiatives, including through wildlife monitoring activities, support for biodiversity conservation groups, and capacity building at the SCER.

2.4 Summary of Regional Biodiversity

Kyrgyzstan is very rich in biodiversity for its relatively small size, possessing some 2 % of the world’s flora and 3% of the world’s fauna.³ The Kumtor mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated Tien Shan region. This region of Eastern Kyrgyzstan includes a large system of rugged mountain ranges extending from China and Kyrgyzstan into India, Pakistan, Uzbekistan and Kazakhstan. From a zoogeographic perspective, this area is part of the greater Palearctic Realm and constitutes the Mountainous Asian Province of the Southern-Palearctic sub region. The biodiversity of the Central Tien Shan Mountains is internationally recognized for its uniqueness and importance as a high priority region for biodiversity conservation. This region features a number of rare and endangered species, which are detailed further in this report, and include the endangered snow leopard.

The EIA⁴ for the Kumtor Project describes the baseline environmental parameters observed at the inception of the project in 1993. This includes climate, air quality, ground and surface water resources (including: fishery resources, plankton, benthic macroinvertebrates, aquatic macrophytes, and fish distribution), terrestrial resources (including: soils, vegetation and habitat types and important vegetation species), mammals, birds and reptiles and amphibians. The EIA identified 13 major biodiversity habitat types, including glaciers, permanent snow fields, vegetated and un-vegetated slopes, moraines, stream channels, vegetated valleys and others.

³ Samanchina, Jarkyn, 2007. Capacity Building of Women in Kyrgyzstan: An example of International Cooperation.

⁴ Kilborn Western Inc., 1993. Kumtor Feasibility Study and Environmental Impact Assessment.

This baseline information, which included numbers of target animals observed from aerial surveys, has been supplemented over the years of operation, with monitoring and support of external studies, in addition to information accumulated by the SCER throughout the history of that protected area. Relevant information from the EIA and SCER is summarized below.

2.4.1 Fauna

2.4.1.1 Mammals

The Kumtor EIA reported 18 species of mammals expected to occur at the Mine site, confirming 10 species with direct observation. The 2008 SCER (Draft) Management Plan⁵ (see Appendix 6) reports that 25 species of mammals occur within the SCER boundaries, which also includes elevations substantially lower than the Kumtor Mine concession. The important mammals of the region are listed in Table 1.

The important mammals of the region include: snow leopard (*Uncia uncia*), manul (*Felis manul*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), stone marten (*Martes foina*), mountain weasel (*Mustela altaica*), weasel (*Mustela nivalis*), ermine (*Mustela erminea*), polecat (*Mustela eversmanni*), Ibex (*Capra ibex sibirica*), Argali (*Ovis ammon*), Grey Marmot (*Marmota baibacina*), Tian-Shan vole (*Sicista tianschanica*), narrow-headed field-vole (*Microtus gregalis*), hare (*Lepus capensis*), Royle's pika (*Ochotona roylei*) and others. Kumtor recognizes five of these species as indicators for biodiversity monitoring and studies, including the snow leopard, argali, ibex, grey marmot and the narrow-headed field vole. Mammals listed as KR Red Data Book species include: snow leopard, brown bear, manul and argali. These are also recognized by IUCN. The Convention on International Trade of Endangered Species (CITES) recognized species include: the snow leopard and manul (Pallas cat), brown bear, marmot, fox, wolf, six species of mustelids (ermine and martins) and the argali (Marco Polo sheep).

⁵ Sarychat-Ertash State Reserve Management Plan 2007-2015, Draft Plan, January 2008 for consultation

Table 1: Key species of mammals reported in Kumtor region⁶

Common Name	Scientific Name	Conservation Recognition
snow leopard	<i>Uncia uncia</i>	KR Red Data Book/IUCN/CITES
manul	<i>Felis manul</i>	KR Red Data Book/IUCN
wolf	<i>Canis lupus</i>	CITES
fox	<i>Vulpes vulpes</i>	CITES
brown bear	<i>Ursus arctos</i>	KR Red Data Book/IUCN/CITES
stone marten	<i>Martes foina</i>	
mountain weasel	<i>Mustela altaica</i>	
weasel	<i>Mustela nivalis</i>	
ermine	<i>Mustela ermine</i>	
polecat	<i>Mustela eversmanni</i>	
ibex	<i>Capra ibex (sibirica)</i>	CITES
argali	<i>Ovis ammon</i>	KR Red Data Book/IUCN
grey marmot	<i>Marmota baibacina</i>	CITES
Tien-Shan vole	<i>Sicista tianschanica</i>	
narrow-headed field-vole	<i>Microtus gregalis</i>	
hare	<i>Lepus capensis</i>	
Royle's pika	<i>Ochotona roylei</i>	

2.4.1.2 Aquatic Organisms

Only two species of fish are known to inhabit portions of the Kumtor Mine site. These are: Tian-Shan scaly osman (*Diptychus gymnogaster*) and Tibetan loach (*Nemachilus stoliczkai*). No amphibians or reptiles have been observed in the baseline or subsequent studies at the Kumtor concession, but the SCER (Draft) Management Plan reports one amphibian (*Bufo viridis*) and one taxonomically unidentified species of reptile within the protected area. The EIA and Kumtor monitoring includes sampling of water quality, fish species and other aquatic data (benthic macroinvertebrates, aquatic macrophytes, habitat, plankton, sediments, etc..) from the Kumtor River and Tagai River (further downstream of the Kumtor Mine site). Knowledge of regional aquatic organisms has also been supplemented by recent studies detailed in SCER surveys and reports.⁷

2.4.1.3 Birds

The EIA noted that 194 species of birds may potentially breed in the Kumtor Project area and observed 26 species present during the baseline study activities. The SCER has recorded 84 species of birds in the reserve, including 31 resident species and 55 migratory (or breeding) species. The notable species among these are listed in Table 2 and include golden eagle (*Aquila chrysaetos*), bearded vulture (*Gypaetus barbatus*), Himalayan griffon (*Gyps himalayensis*), Eurasian griffon (*Gyps fulvus*), cinereous vulture (*Aegypius monachus*) and saker falcon (*Falco cherrug*). Galliforms include Himalayan snowcock (*Tetraogallus himalayensis*), chukar (*Alectoris chukar*) and Daurian partridge (*Perdix dauuricae*). Ruddy

⁶ Kumtor EIA, SCER Draft Management Plan, SCER monitoring report 2009

⁷ Aquatic Fauna of the Sarychat-Ertash Reserve

shelduck (*Tadorna ferruginea*) and lesser sand plover (*Charadrius mongolus*) can also be found at mountain lakes. Passerine birds include red-billed chough (*Pyrrhocorax pyrrhocorax*), Yellow-billed chough (*Pyrrhocorax graculus*), horned lark (*Eremophila alpestris*), Brandt's mountain finch (*Leucosticte brandti*), plain mountain finch (*Leucosticte nemoricola*), wallcreeper (*Tichodroma muraria*) and other species. These include four Red Data Book bird species: golden eagle, bearded vulture, Himalayan vulture and saker falcon. Recent detailed studied of birds in the adjacent SCER has also been recently completed.⁸

Table 2: Notable bird species recorded in the SCER (draft) Management Plan

Common Name	Scientific Name	Conservation Status
golden eagle	<i>Aquila chrysaetos</i>	KR Red Data Book listed
bearded vulture	<i>Gypaetus barbatus</i>	KR Red Data Book listed
Himalayan griffon	<i>Gyps himalayensis</i>	KR Red Data Book listed
Eurasian griffon	<i>Gyps fulvus</i>	
cinereous vulture	<i>Aegypius monachus</i>	
saker falcon	<i>Falco cherrug</i>	KR Red Data Book listed
Himalayan snowcock	<i>Tetraogallus himalayensis</i>	
chukar	<i>Alectoris chukar</i>	
Daurian partridge	<i>Perdix dauuricae</i>	
ruddy shelduck	<i>Tadorna ferruginea</i>	
lesser sandplover	<i>Charadrius mongolus</i>	
red-billed chough	<i>Pyrrhocorax pyrrhocorax</i>	
yellow-billed chough	<i>Pyrrhocorax graculus</i>	
horned lark	<i>Eremophila alpestris</i>	
Brandt's mountain finch	<i>Leucosticte brandti</i>	
plain mountain finch	<i>Leucosticte nemoricola</i>	
wallcreeper	<i>Tichodroma muraria</i>	

2.4.2 Flora

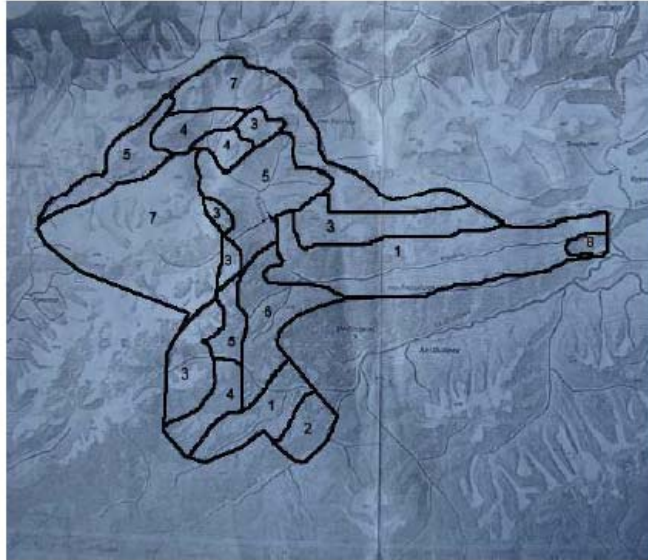
The regional vegetation has evolved under the influence of extreme factors - sharply continental, cold and dry climate, elevation, intensity of solar radiation, open wide flat areas dominated by wind with no snow cover in winter time. This has led to a prevalence of bushy and blanket cover type plants, with a dominance of high altitude, mono-dominant wormwood deserts and shallow Festuca steppes.⁹

The 13 major vegetation habitat identified in the EIA include: Glaciers, High Altitude Pastures, Alpine Belt, Nival Belt, Riparian habitats, Wetland Communities, and Aquatic ecosystems. More recent surveys of the flora of the SCER and adjoining planned buffer zones indicates eight major floral communities in the SCER (see Figure 4), of which five are in close proximity to the Kuntor concession.

⁸ SCER Survey Report 2009, A.P Vereshagin

⁹ SCER MP at 10

Figure 4: Distribution of eight major floral habitat types in the Sarychat Ertash Nature Reserve¹⁰



Legend:

1. Turano-dzungari subshrub deserts, Halophytic communities, Central Asian “gammads” and dry steppes with fragments of white forest and relict large-scale cereals.
2. Meadow-steppes and meadows.
3. Cryoxerophilous cushion plant formations.
4. Cryophile steppes.
5. Cryomesophilous grass carpets (highland waste plots) and saz steppes.
6. Dry steppes and true steppes.
7. Glaciers and Petrophilic vegetation.
8. Mountain taiga.

¹⁰ Laskov, Georgy, 2012. State of Flora around the Kumtor Mine. Presentation at Kumtor’s 19 October 2012 Stakeholder Biodiversity Workshop, Bishkek, Kyrgyzstan

The Kumtor EIA recorded 159 species of vascular plants, belonging to 22 families that were collected in the EIA study area, of which 8 were noted to be endemic to the Tien Shan Mountains. The most recent survey of the Kumtor area records 205 species in 33 families. The updated list of plant species, and results of 2012 KOC vegetation monitoring studies are attached as Appendix 5¹¹ and Appendix 6¹². In addition, a biophysical map was generated for the EIA identifying 13 distinct habitat types and both terrestrial vegetation and wildlife components were assessed for the environmental baseline including the upper Targai River and the Kumtor River Valley. These baseline studies also included the access roads and utility corridors.

Surveys and studies of regional vegetation is a high priority for the SCER, which reports 118 species presently identified, with this number expected to increase significantly as more of the region is studied. SCER also identifies five altitudinal zones, including more than 30 elementary vegetation communities.

Species identified within the SCER and described as endemic to Kyrgyzstan include: *Ranunculus popovii* (species of buttercup), *Ranunculus transiliensis* (buttercup), *Ranunculus brotherusii* (buttercup), *Rhodidola linearifolia* (scdum), *Gagea michaelis* (no common name), *Taraxacum syrtorum* (dandelion), *Crepls nana* (hawkscard), *Hedysarum larghisorum* (sweet vetc.h). *Minuania schischldnii* (species of sandwort), a plant endemic to the Tien-Shan and Pamir Mountains, is also documented within the Kumtor Concession.

Hedysarum kirghisorum is the only species encountered that was listed in the Red Book of Kyrgyzstan (1985) at the time of the initial baseline for Kumtor. This plant grows in alpine and subalpine meadows near streams and springs, and along river banks. It has been documented on southwest-facing slopes at three sites in the Kumtor valley including: the Dzikutshak canyon on the Tcrskey-Alatau ridge, the origin of the Kumtor River on the Akshirak ridge and the Chong-Sarytor Creek canyon on the Akshirak ridge. This species was not included, however, in the most recent edition of the Kyrgyzstan Red Data Book on Endangered Species (2007)¹³, but should still be considered in management objectives of KOC.

CITES lists only one species of plant from Kyrgyzstan, which is an orchid (*Cephalanthera longifolia*) not observed with the Kumtor Concession.

2.4.2.1 Invertebrates

Aquatic invertebrates were included in the EIA baseline and subsequent monitoring. In total, 21 taxonomic groups were identified from the Kumtor River during each of the EIA sampling periods (June and July 1993). The Taragay River contained a total of 18 and 16 taxonomic groups in the June and July samples, respectively.

¹¹Lazkov, Georgy, 2012.

¹² Report on soil and vegetation research of Kumtor Mine Site to implement rehabilitation 06/1/2012- 09/30/2012.

¹³ Kyrgyz Republic Red Data Book. 2008

The taxonomic diversity and abundance of both the phytoplankton and the zooplankton communities in Petrov Lake are very low. They consist of two genera of phytoplankton and four zooplankton species, these species are also found widespread in the alpine regions of Tien-Shan and Pamir.

The macroinvertebrate community in Petrov Lake is poorly developed, consisting of only two species of chironomids (midges). This is attributed to low water temperatures and the low influx of nutrients from the toe of Petrov Glacier. Samples from the Kumtor River and the Taragay River are dominated by the larval stages of chironomids, both in the numbers of species present and biomass. The following higher taxonomic groups have also been identified from stream samples: Plecoptera (stoneflies), Colcoptera (beetles), Tricoptera (caddisflies), Ephemeroptera (mayflies), Oligochcates (aquatic earthworms), Platyhelminthes (Qatworms) and Nematodes (roundworms).

Terrestrial invertebrates in the Kumtor Mine region have been poorly studied and are noted as a priority for surveys by the SCER. Butterflies are widespread in the region and some important high altitude communities have been identified, including many species believed to be endemic to the Tien Shan region. Notable Red Data Book species include: the Tien Shan Apollo (*Parmassius tianshanicus*), and the swallowtail (*Papilio machoan*).

2.5 Climate Change

The projected effects from climate change to regional biodiversity of the Central Asian Mountain ecosystems are expected to be among the more dramatic climate driven impacts to biodiversity around the world. Given that the high altitude glaciated areas of Central Asia are residual Ice Age (Pleistocene Era- or 2.5 million bpy to approximately 11.7 thousand bpy) formations, and predictions that up to 95 percent of these ancient geographical features will likely disappear in the short span of about 100 years, the scope of change affecting basic habitats, ecosystems, communities and species that have evolved with natural constraints of the harsh and glaciated region is likely to be rapid and dramatic.

Further, the Tien Shan Mountains, together with other Central Asian Mountains (Pamirs and Himalayas) are effectively an island of unique biodiversity, surrounded by the Mongolian and Gobi deserts and lower elevations on all sides. This region exhibits classic characteristics of island biogeography. Therefore, as expected, there are very high levels of endemism and unique species assemblages. This means that there are plants, animals and invertebrates that are found nowhere else in the world, such as the snow leopard, Marco Polo Sheep, Ibex and many other lesser known organisms.

The Kumtor Mine is situated in a partially glaciated region in the Central Tien Shan Mountains. There are five active glaciers adjoining, or partially within the KOC license boundaries. The largest of these is the Petrov Glacier, which also is the source for Petrov Lake, used as a water source for the mine. The others are Davidov Glacier (which is in partial contact with the main pit), Lysyi Glacier (which partially covers the upper portion of the Kumtor deposit), Sary-Tor Glacier and Boordu Glacier. The lowest portions of these glaciers (toes) have an approximate elevation of 3,800 to 3,900 meters above sea level (masl).

Combined, these five glaciers currently occupy a surface area of approximately 100 km². As is the case with most glaciers, the ones in and around the Kumtor Mine continue a relatively slow down slope

movement and have a negative mass balance. This means that there is a net loss of glacial ice mass each year.

Over the last fifty years, scientists have documented a significant retreat – or ablation – of all of these glaciers, as has been similarly observed and documented throughout all of Central Asia. These include the discussions and predictions of Climate Change impacts on glaciers across Kyrgyzstan contained in the Second National Communication of the Kyrgyz Republic to the United Nation Framework Convention on Climate Change (UNFCCC) and recent studies by the United Nations Development Program (UNDP).

The predicted state of glaciation in 2025 compared to KR's glacier catalogue developed in the 1960s is presented in Figure 5. KR's UN submission notes that for "the Republic as a whole, the reduction of glaciation area from 64 percent up to 95 percent from year 2000 till year 2100 is predicted, depending on the accepted variant of climatic scenario."¹⁴

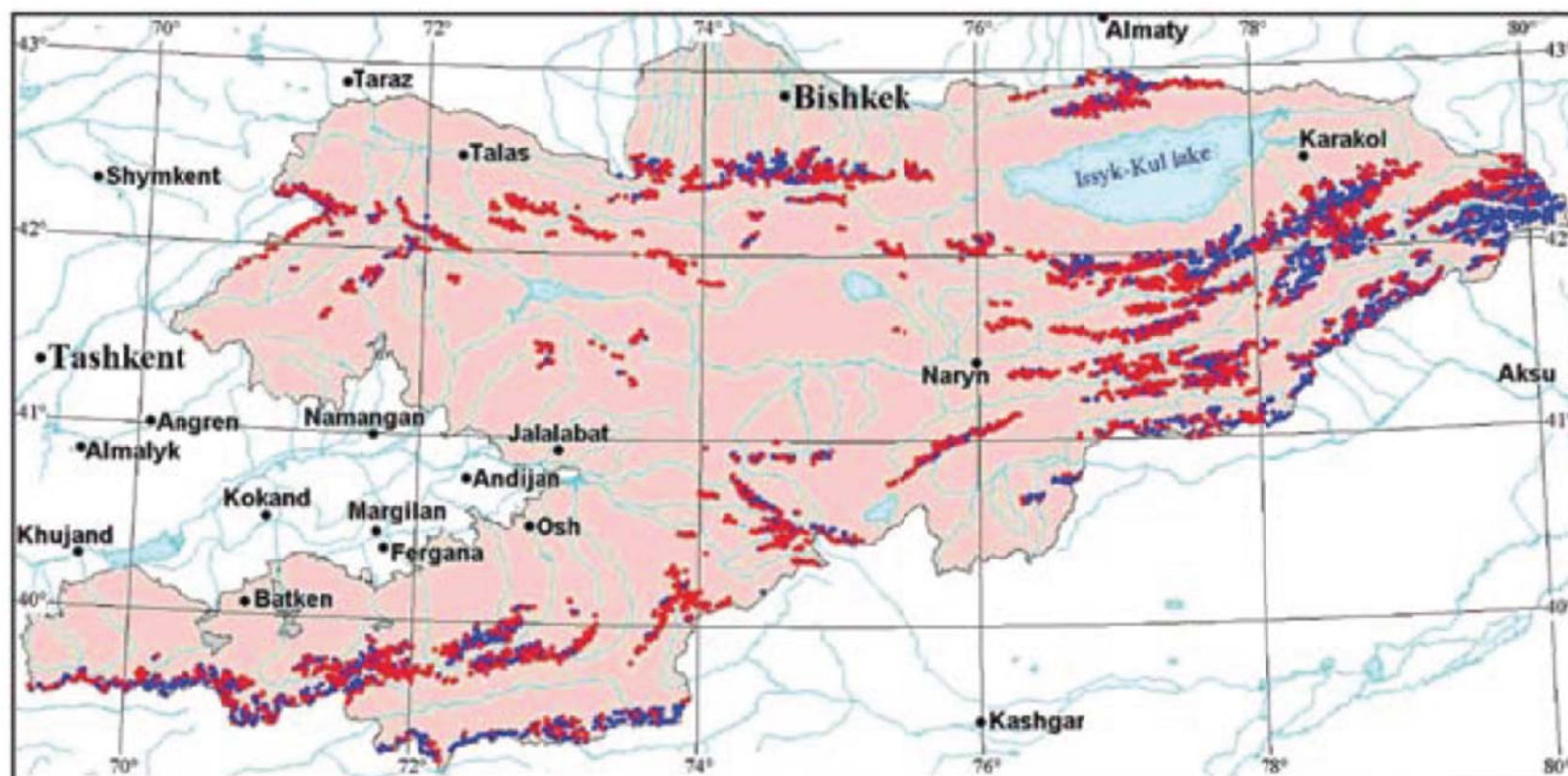
While the most significant impacts on biodiversity in general from climate change in the Tien Shan region are expected to manifest at somewhat lower elevations than the Kumtor Mine and are associated with tree-line shifts to higher relative elevations, higher elevation habitats –such as those in the region of the Kumtor Mine remain important as areas that should be insulated and less vulnerable to impacts. More importantly, areas that have stable populations of important species such as snow leopards and argali become a priority for conservation efforts.¹⁵ Further, current international research points out that it is also essential to identify and address non-climate related anthropogenic threats to biodiversity, that include over-grazing, hunting and other land-use practices.¹⁶

¹⁴ Iliasov, S. and V. Yakimov, 2009.

¹⁵ Forrest, Jessica, L. et al. 2012 Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation* 150 (2012) 129-135.

¹⁶ Op cit.

Figure 5: Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change



Note: Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change impacts compared to glacier catalogue developed in the 1960s (extinct glaciers marked with red, extant glaciers marked with dark blue). Source: Kyrgyzstan's Second National Communication of the Kyrgyz Republic to the United Nation Framework Convention on Climate Change (UNFCCC).

3 Cultural Heritage and Sites

Cultural heritage aspects of the central Tien Shan region have important historic and on-going influence and relevance to regional biodiversity. Traditional practices of herding in the high altitude pastures, in addition to hunting and broader perceptions of animals (and more indirectly, vegetation communities) as resources to be exploited are deeply ingrained in local communities and inhabitants. The SCER Management Plan also describes “Sacred Sites” that occur in the region, including cultural and natural sites as detailed further below. None of these is located within the immediate vicinity of the Kumtor mine or related infrastructure. The nearest significant petroglyph pictured below is located approximate 14 km distance from the mine site. Kumtor also maintains Chance Find Operating Instructions. Explorations activities require logging any cultural heritage sites and reporting to the KR Government.

3.1 Cultural sites

There are a number of burial sites within the SCER. These consist of ruined mazars and graveyards from different historical periods and various ethnic groups. Tashtar-Ata, a place of worship, is located in the area described as the buffer zone of the SCER, some 12 km from Koenduu SCER headquarters. Other cultural heritage sites include Kalmyk burial grounds and historical kumbezs. Approximately 8 km from the check-point to the Kumtor mine is a very large glacial moraine boulder that features extensive petroglyphs. This site has experienced partial vandalism and a portion of the petroglyph has been destroyed.

Another important cultural site at a distance of approximately 40 km to the Kumtor Mine is Bedel Pass, which connected Kyrgyzstan to China via Barskaun and the Xinjiang Province. Some researchers relate that up to 100,000 Kyrgyz died here during the Urkun (revolt against the Tsar) in 1916. A number of other sites where Kyrgyz who revolted against the Tsar were shot are also places of pilgrimage. A number of other rock paintings, such as the petroglyphs portraying animals and hunting scenes, are also found at Saimaluu-Tash.

3.2 Natural sites

The natural geomorphic processes of alpine rivers and moving glaciers create numerous glacial lakes in the general region of the Kumtor Mine such as Bash-Kel, Achy-Kel and Kyzyl, and natural springs such as those at Eshek-Art, Koiluu, Koenduu and Uch-Kel. According to the SCER Draft Management Plan, all of these are worshiped and considered sacred. In addition, several peaks occur in the region with elevations of 6,000 to 7,000 meters and many are revered or considered sacred to some local inhabitants. This includes the Khan Tingre, the tallest mountain in Kyrgyzstan. Khan Tingre is being considered as another protected area – or *Zapovednik* -, which would make it the closest protected area to SCER, with potential for connectivity via corridors of movement for important species.

Figure 6: Moraine boulder with vandalized petroglyphs at 14 km distance from the Kumtor Mine



3.3 Cultural Heritage

Additional activities occurring in the region that pertain to cultural heritage include: subsistence hunting, traditional grazing of livestock in the high altitude pastures of the region, traditional customs, folk-arts and crafts. These include producing clothing and other objects from felt, leather and other materials, use of native wild berries, nuts and fruits for preserves and fresh food sources. Additionally, long standing cultural perceptions regarding human dominion over wildlife, and animals in general, have a subtle, yet significant, influence on meaningful implementation of conservation measures, particularly pertaining to biodiversity within the greater region.

4 Stakeholders

4.1 Introduction

The presence of threatened, endangered and rare flora and fauna in the broader Kumtor project area, the existence of the SCER (*Zapovednik*) which also serves as the core zone of the Issyk-Kul Biosphere Reserve, and the presence of “hunting camps” which provide opportunity for lucrative international trophy hunting¹⁷ mean that a number of stakeholders will be interested in Kumtor’s activities that may be related to biodiversity issues in the region.

As part of the development of this BMSP, a stakeholder focus group meeting was convened in October 2012 in Bishkek. This meeting gathered eminent Kyrgyz experts, representatives from the SCER and the Naryn Reserves, regulators and conservation NGOs. The meeting was facilitated by Prizma, LLC and hosted by KOC. A summary of this workshop generated by a representative of Flora and Fauna International (FFI), along with a list of participants is provided in Appendix 3 and Appendix 4, respectively. Prizma also attended parts of the international Snow Leopard and Argali Networks workshops in Kyrgyzstan, and – along with Kumtor’s senior management – met with representatives of WWF (Russia, Kyrgyzstan) and the Snow Leopard Trust Kyrgyzstan¹⁸ in December 2012.

4.2 Regulators

At this time, there appears to be no specific legislation that would require research and monitoring of the status of biodiversity by economic actors like a mining company. However, key stakeholders include Kyrgyz regulatory agencies, particularly the State Agency of Environmental Protection and Forestry, which maintains responsibility for the implementation of the KR biodiversity conservation strategy, is a key stakeholder. This agency includes a number of departments, including Natural Reserves and National Parks, Department of Hunting Control, and Regulation of Hunting Resources Population.

4.3 Financial Stakeholders

Approximately 33% of Centerra Gold’s shares are owned by Kyrgyzaltyn, a Kyrgyz State Owned Enterprise. Approximately 50% of Centerra Gold is owned by Institutional Shareholders and the remainder by retail shareholders. The European Bank for Reconstructions and Development (EBRD) was an original project financier of the Kumtor Project. It maintains a revolving corporate loan facility with Centerra Gold. The EBRD (and IFC) provided grant-funding for a number of conservation-oriented technical cooperation programs involving Kumtor and the SCER.

4.4 Local Communities

Given its remote and high-altitude location, there are no permanent communities immediately next to the Kumtor mine site. During the short summer months, shepherds graze their livestock (mostly sheep and, to a lesser extent, horses and cattle) in the valleys en route to the Kumtor mine, as well as

¹⁷ According to information contained in the Parliamentary Commission Report (2012), 70 licenses are issued annually for hunting of argali.

¹⁸ WWF explored opportunities to collaborate on small grants programs, anti-poaching and hunting monitoring, and social baseline studies.

throughout the greater region. These shepherds are typically housed in traditional (temporary) yurts or caravan-style facilities. During the summer months, these can be seen located tens of kilometers away from the mine site and several hundreds of meters off Kumtor's technical road, adjacent to small lakes or streams (see Figure 7).

Figure 7: Livestock grazing during summer in high altitude pastures en route to the Kumtor mine



During the Soviet era, the number of sheep was much larger and contributed to overgrazing of the high altitude pastures (competing with the Marco Polo sheep and Ibex). Following the collapse of the Soviet Union the number of livestock dropped dramatically, although they appear to be rebounding. Based on the discussions during the October 2012 stakeholder meeting, it is understood that, in general, the flocks of sheep grazed in the high altitude pastures are not vaccinated. In addition to adverse impact on livelihoods of shepherds and owners of the sheep, lack of vaccination has also been hypothesized to be adversely impacting wildlife by spreading disease.

The nearest village to the mine site is Ak-Shyrak, located well above the tree line elevation and originating from Soviet-era geological camps and outposts. This village is situated some 147 km from the mine site, via unpaved and difficult road maintained mostly by Kumtor. Ak Shyrak is approximately 18 km eastward of the SCER headquarters at the Koenduu which is the only access point to the southern border of the SCER.

Figure 8: Headquarters of SCER (left) visited en route to Ak Shyrak (right) in October 2012



The estimated total village population is approximately 120. This includes a number of the Reserve's rangers and their families. The village also features a newly constructed school for approximately 50 children. The community is very isolated and even inaccessible for several months of the year due to high flows of rivers and boggy conditions of the terrain and inaccessibility during parts of the winter.

In addition to government provided incomes and subsidies, the subsistence-oriented livelihood of the community appears to be reliant on flocks of sheep and goats, and other livestock that is pastured in surrounding meadows, which the local residents do not own. Local communities also harvest fruits, berries and other native vegetation when available. In addition to electrical power supplied through a power line extending approximately 200 km to the town of Naryn, dried dung collected from the livestock serves as heating and cooking fuel.

The village of Barskaun is located near the beginning of Kumtor's Technical Road, an unpaved gravel road which starts near Lake Issyk-Kul. This road serves also as an access road to the SCER and hunting areas. The distance from Barskaun to the Kumtor mine is approximately 90 km along a gravel road that is maintained by Kumtor.

4.5 Hunting and Tourism

It is understood that the SCER is presently surrounded by seven "hunting camps" or "farms" (such as "Sevian"). Their location is depicted in Figure 3. The hunting farms are large tracks of land that are controlled by licenses and lease payments sometimes provided by the license holders based on population numbers of target species such as argali and ibex. These organizations appear to mainly target international trophy hunters who pay international outfitters in the order of US\$25,000 and US\$5,000 to hunt Marco Polo sheep and ibex, respectively. Poaching and trophy hunting along with lack of sufficient income generation for local communities remain key areas of concern to a number of local stakeholders, as highlighted during recent surveys and reports published from the SCER¹⁹ and discussions during the October 2012 stakeholder workshop.

¹⁹ Vereshagin, Alexander, 2009.

Figure 9: Hunting Camp located approximately 20 km from the SCER headquarters.



There appears to be no other substantial tourism activities in and around Kumtor and the SCER. In addition to lack of appropriate infrastructure (qualified staff, transport, hotels, environmental paths, observation points etc.), this may be due to restrictions associated with the status of the SCER as a *Zapovednic*. This limits land use strictly to conservation and scientific studies and does not provide an opportunity for eco-tourism or similar income generation opportunities. Regional ecotourism projects supported in the past by Kumtor have been largely perceived to be unsuccessful due to lack of sustainability without continued Kumtor funding.

4.6 Other Key Stakeholders

Other important stakeholders include biodiversity conservation oriented academic and non-governmental organizations. These include Flora and Fauna International (FFI), the International Snow Leopard Trust (ISLT), World Wildlife Fund (WWF), *Naturschutzbund Deutschland* (NABU) and *Pantera* and others involved in the Snow Leopard Conservation and Argali Networks.

The research community includes a group associated with Professor Shigeyuki Izumiyama from Japan involved with the SCER staff in tagging and satellite monitoring of wildlife. Other ornithological expeditions have been mounted by Bastin Chez (France), Michel Louis Jean (Belgium). Botanical researches at the SCER were also conducted by the SCER staff and a herbarium consisting of 250 plants species was provided to the National Academy of Science to be identified by Dr. G. Lazkov.

There are also scientists studying Climate Change and glaciers who have been conducting their research in the Kumtor valley and glaciers around the Kumtor mine. Their research may have mine closure and biodiversity conservation relevance.

In addition to NGOs and academic researchers, management and staff of other Kyrgyz protected areas and reserves, such as the closest reserve in Naryn, are also considered stakeholders for the purpose of this BMSP.

5 Biodiversity Management Strategy

5.1 Introduction

The overall goal of the Kumtor Biodiversity Management Strategy and Plan (BMSP) is to expand, develop additional programs (as needed), and further integrate the aspect of biodiversity into the Kumtor's existing and/or updates of social and environmental management and mine closure frameworks. The BMSP will build on current KOC activities that pertain directly, or indirectly, to biodiversity; seek to enhance the existing and/or develop new partnerships with key stakeholders and government; further supplement the substantial baseline and monitoring data accumulated over the past 20 years; and enable and support related engagement and communication efforts. The purpose and scope of the BMSP will be included as training for key personnel and staff, including biodiversity conservation awareness. The BMSP will specifically target remaining years of operation and into closure, including post-closure. The BMSP will be regularly tracked and updated annually to verify that the plan is appropriate and being implemented. In addition, the BMSP will be subject to external review at every three years

Kumtor and its BMSP recognize that the most significant biodiversity conservation value and innovation can be achieved and leveraged through a more collaborative effort as conceptually depicted in Figure 10. This figure depicts a trajectory that expands biodiversity efforts from those only required for compliance to broader, regional based initiatives that promote lasting benefits and seeking ways to take a leading role in regional biodiversity conservation. In structuring its platform, this BMSP also adopted a conceptual model promoted by ICMC that identifies biodiversity conservation opportunities that range from 'Within the Fence Line' (Kumtor Concession) to broader 'Areas of Influence' (see Figure 11, reproduced from Figure 7.1 in ICMC, 2006).

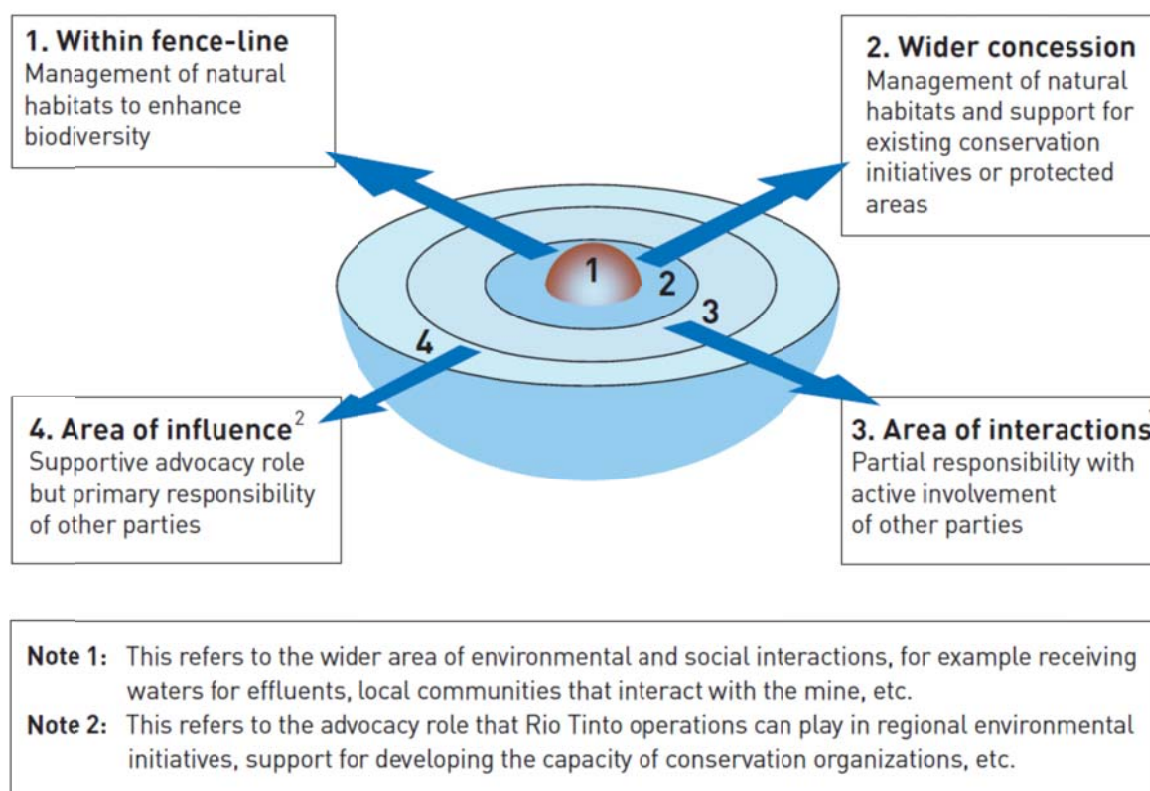
Figure 10: Moving Kumtor's BMSP from compliance to innovation



5.2 Policy and Operating Standards

Centerra's corporate policy and operating standards note its commitment to contribute to the protection and conservation of biodiversity and requires the application of integrated approaches to land-use planning throughout the mining lifecycle. Centerra also recognizes the need for and value of dialogue with local stakeholders, and to reduce or eliminate significant impacts on biodiversity and ecosystem services. Where feasible, Centerra also seeks to identify opportunities to enhance and improve local ecosystems and related economic development. Each Centerra site is required to develop biodiversity management plans, programs and procedures which apply to the entire mining lifecycle, including exploration, evaluation, operation and closure with appropriate resources from annual budgeting. These are to be aligned with Good International Industry Practice. This means also that such management plans will apply the mitigation hierarchy, beginning with avoidance and followed by minimization, mitigation and then offsetting if appropriate. Kumtor will also develop and implement Biodiversity Enhancements (BE) as an additional component of the mitigation hierarchy approach.

Figure 11: Identifying opportunities for biodiversity conservation or enhancement (from S. Johnson in ICMM, 2006)



5.3 Environmental Management System

Kumtor already maintains an Environmental Management System (EMS), aligned with ISO 14,001 framework, and is part of commitments under Kumtor's Environmental Management Action Plan (EMAP). The EMAP was originally developed in 1995. It has been updated from time to time (last revision: 2010) is also referenced in the latest (2009) Restated Investment Agreements. It defines Kumtor's commitments to maintain the Kumtor Mine operations in material compliance with Canadian, Saskatchewan and World Bank environmental health and safety laws, regulations, policies and guidelines, in addition to meeting regulatory requirements of the Kyrgyz Republic. This BMSP will serve as a vehicle to further develop and integrate (mainstream) key aspects of biodiversity management into Kumtor's EMS and its mine closure planning process in line with corporate policies and evolving GIIP.

5.4 Climate Change

Although Kumtor will not be able to combat the broader effects of Climate Change in the region, Kumtor is in a unique situation with regard to monitoring the impact of Climate Change. Kumtor maintains a modern meteorological station at its high altitude location, which is a registered national meteorological station as defined by a partnership agreement with KyrgyzHydromet weather service. Data from the Kumtor weather station is transmitted directly to Bishkek and contributes to the Tien Shan weather report provided to internet meteorological sites. Kumtor has also accumulated a substantial data set of related information, including glacial movement, changes in volumes of Lake Petrov (and studying its moraine dam), groundwater and surface water flow rates and volumes, climatological information and temperature profile (mostly related to its TMF). Climate Change related data monitored at Kumtor will not only be able to inform its future mining and closure planning processes, but can also inform the biodiversity conversation community and improve their Climate Change impact assessment and development of adaptation/resilience strategies, including regional and international programs to better enable ecologically appropriate land use and management.²⁰

5.5 Mine Closure

Both Centerra and KOC corporate policies and the most recent Investment Agreements detail a number of Mine Closure related commitments. These include the development of a reclamation plan and a Conceptual Closure Plan (CCP). This is regularly updated throughout the life of the mine, and is expected to culminate in a Final Closure Plan (FCP), which must be completed within two years of cessation of mining operations. Provisions pertaining to closure planning, financing, regulatory approval and/or government intervention are outlined in the Kumtor CCP and are also described in Kumtor's Annual Environmental Reports and include:

²⁰ Forrest, Jessica, L. et al. 2012 Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation* 150 (2012) 129-135.

- Maintaining a strict no-hunting policy
- Continuance of wildlife studies emphasizing critical areas, dispersion routes and migration corridors for ungulates
- Management of the KR Ministry of Environment Protection monitoring control station at the bottom of Sary Monok Pass (also called Barskaun Pass) and at a monitoring station established seven km from the Kumtor gate entrance to limit poaching

Important components of the above that relate to biodiversity include: reclamation activities that support function as a high alpine wildlife habitat and return land to a suitable post-mining end-use, geochemical and geotechnical stability of the site and efforts that ensure that effluents and discharges meet acceptable national and international water quality standards. In line with evolving GIIP, KOC will further integrate biodiversity related issues into the next iterations of the CCP. As per the latest (2009) investment agreement, following notification about planned termination of operation, the Kyrgyz Government will have the ability to change plans and, for example, choose to continue operations.

5.6 Engagement and Communications

Kumtor is committed to active and on-going stakeholder engagement regarding the development and implementation of its biodiversity strategy. Cross-sectorial workshops and meetings, including one conducted on October 19, 2012 (summarized in Appendix 3) have confirmed the importance and value of such activities. Stakeholders have identified the utility in alignment of Kumtor's biodiversity management strategy with national planning, regional institutions, such as the SCER, and active and interested stakeholders, such as FFI. Further, communication and dissemination of important developments, adoption of management strategies and plans, as well as publication of significant research and studies are acknowledged as valuable opportunities.

6 Proposed Biodiversity Management Plan

6.1 Policies, Operational Standards and Instructions

In line with its Biodiversity Management Strategy, KOC will be further integrating (mainstreaming) biodiversity into its broader exploration, operations, closure and related environmental and social programs. The BMSP will be subject to updates and approval by senior management in response to significant changes in the life cycle of the operation. KOC will establish a designated format for employee training for biodiversity awareness, management of biodiversity information and data, procedures for documentation and record keeping, including in Annual Environmental Reports. Monitoring and reporting of biodiversity impacts, gains and trends will be conducted with an attempt to seamlessly integrate these with regional activities and institutions that pertain to biodiversity conservation, such as the activities associated with the SCER.

The current policies and operational standards outlined in corporate policies and the Kumtor EMAP, which require monitoring wildlife in three-year intervals, will be amended and refer to this BMSP, which has a broader scope and collaborative implementation of biodiversity monitoring activities that include: continuous tracking (documenting) wildlife on-site through broader participation of Kumtor employees, annual biodiversity monitoring and studies, broader inclusion of vegetation communities, invertebrates and aquatic organisms in monitoring and closure planning activities, and more structured engagement with relevant stakeholders, including the SCER.

6.2 Further Reduce and Mitigate Operational Impacts

This biodiversity management strategy will allow Kumtor to further reduce and mitigate any significant ongoing or future impacts to biodiversity by tracking and monitoring key components, indicator species described herein and incorporated from future investigations, and patterns of abundance, distribution and/or movement of key species in, or through, the Project area. To accomplish this, KOC will implement a GIS based monitoring strategy that tracks important activities throughout the concession, including biodiversity data. This will also require an understanding of broader, regional biodiversity risks and impacts which are not related to Kumtor's mining footprint and are believed to be the main risks to regional biodiversity.

It is intended that important information collected to date and supplemented with additional information obtained from implementation of this BMSP will facilitate assessment of existing or potential future impacts to biodiversity resulting from on-going operations or any expansion activities, such as increases in LOM, future exploration and changes to project design or infrastructure.

KOC will maintain its no-hunting policy. KOC will also improve recording, analysis and reporting of wildlife observations and responses to ongoing activities and infrastructure. This will include monitoring impacts to wildlife and water fowls from the TMF pond (if any) and impacts associated with the use of wolf repellent; expanding biodiversity baseline (discussed below); and employing a mitigation hierarchy approach to evaluating, avoiding, mitigating or offsetting impacts to biodiversity resulting from

expanded footprint areas, including prescreening exploration or new footprint areas for biodiversity (including cultural heritage)²¹ and environmental parameters. Any additional biodiversity concerns which may be raised by KR commissions and other KR regulatory authorities will also be considered. At this time, such concerns raised include potential historic impacts to wildlife in relations to Kumtor's exploration activities outside of the Kumtor Concession and within formerly licensed exploration areas. Related activities involved using and improving existing roads to, for example, the Ishigard pass, which were already constructed during the Soviet time. Kumtor has already refilled its exploration trenches. In addition, a review of historic exploration areas will be undertaken to determine the need for any additional reclamation activities. It is noteworthy, that at the time of drafting this BMSP, no new exploration outside of the concession is underway, and none is anticipated in the immediate future.

6.3 Initial Screening of Exploration Projects

KOC will adopt a formal screening process prior to the onset of exploration activities once such priority exploration targets have been identified and a formal screening/ checklist to be completed for any currently undisturbed areas proposed to be impacted within the Concession area. This screening will be conducted or supervised by Kumtor's Environmental Department. Adopting the guidance provided by ICMM²², the objective of the screening is an initial appraisal of the biodiversity context of an exploration site or expansion project. The following primarily desk-based steps can help to initially establish the biodiversity context and risks:

- obtaining readily available information on biodiversity through review of maps, external publications, stakeholder perspectives - which can provide insights on traditional or cultural value and use of area - and any information that may be readily available;
- identifying whether the site or surrounding area falls within a protected area – that is, whether it is an area designated for biodiversity protection at a local, national, regional or international level;
- identifying whether the site or surrounding area is not currently protected but has been identified by governments or other stakeholders as having a high biodiversity conservation priority;
- identifying whether the site or surrounding area has particular species that may be under threat (although the area may not currently be officially protected); and
- reviewing relevant legal provisions relating to biodiversity.

Where this initial screening stage identifies areas of high importance for biodiversity (or cultural heritage), more detailed consideration should be given to possible impacts on such areas, both direct and indirect, such as the impacts from ancillary infrastructure, such as roads, etc. This review may trigger the need for baseline studies to support further decision making processes. Also, each exploration program should include a recovery and reclamation plan and budget.

²¹ KOC already maintains a chance find procedures (latest version: 12/9/2009).

²² ICMM, 2006. Good Practice Guidance for Mining and Biodiversity

6.4 Monitoring and Inventories

On-going and new biodiversity monitoring programs will be reviewed and developed to address Kumtor's immediate operational requirements. These will also be adjusted, if needed, to complement and support research objectives identified in SCER Management Plan, expected to be revised and updated in early 2013. Much of this is expected to be accomplished in tandem with and through global and regional partnerships as detailed below.

Kumtor has accumulated a detailed baseline data set describing the biodiversity of the project area in a regional perspective. In line with emerging GIIP, this BMSP provides a framework to conduct on-going biodiversity monitoring as a vehicle to monitor and track important biodiversity developments related to the project through the remaining years of operation and through closure of the project. This initiative will include the following initial specific objectives:

- On-going review and study of the changes in biodiversity within the project area (and associated infrastructure) and implications for surrounding or adjacent areas, including the SCER;
- Observe (through engagement and knowledge management) major changes and trends in biodiversity impacts (+/-) adjacent/outside the immediate Kumtor Concession and exploration license areas;
- Periodic evaluation of impacts to, and/or net positive biodiversity gains, primarily focused on, but limited to, floral and faunal components (Kumtor Concession and the regional ecosystem);
- Periodic assessment of changes in presence or absence of species with special conservation status, including to updated changes in relevant catalogues of protected species (i.e. IUCN listed species, KR Red Data Book species, species with special conservation status under CITES, etc.);
- Further incorporate standardized methodologies of data collection – such as GIS-supported methodologies - and data management to interface with, and support, similar programs in SCER and other third-party initiatives; and
- Identification of areas of high in biodiversity and conservation value, such as corridors for movement, migration corridors, connectivity to other regional protected areas, or areas important for reproductive fitness (breeding, rearing, etc.), or unique habitat types with high conservation value.

Initial monitoring objectives to be addressed in this first iteration of the Kumtor BMSP will update or enhance understanding of the following specific components:

1. Fauna monitoring initiatives with focus on:
 - (a) initiating a program of a more formalized and routine on-site monitoring whereby wildlife observations may be recorded on standard data sheets – or via radio communication - to more closely track and document wildlife observations by employees and staff of KOC *en route* to and at the mine site. This effort will be supplemented with an employee education/ training program to explain the importance of biodiversity monitoring and key species identification²³;

²³ Kumtor Employee Monitoring Program and data sheets are attached as Appendix 7.

(b) define corridors of movement and migration patterns of key species, including through and/or near the Kumtor Concession and exploration areas. Indicator species include argali, ibex, snow leopards, brown bear, eagles, vultures and falcons. The effort will also seek to leverage opportunities for synergy and integration of existing remote sensing studies for indicator species such as argali, and consider opportunities to expand these to other key species such as ibex and wolves and identify areas of high biodiversity value.

2. Flora monitoring initiatives with focus on:

- (a) vegetation within the project footprint area Specific objectives of the Flora monitoring will include: a) how vegetation community assemblages relate to specific vegetation zones (such as vegetated slopes, vegetated valleys, riparian zones, etc.);
- (b) identification of important species and groups of species with utility for reclamation and closure,
- (c) identification and documentation of other major impacts to regional vegetation important to greater ecosystem services (i.e. food base for key species);
- (d) identification of species and groups of species to be targeted for vegetation test plots. Monitoring of test plots should be designed to evaluate length of time required for recovery (re-vegetation), important soil and other environmental conditions required for feasible and successful re-vegetation or identification of suitable “reclamation offsets” that can provide more feasible and more desirable sustainable land use options and ecosystem services with enhanced socio-economic impacts; (see Skryabin, K.I. and Turgunbaev K.T, 2012 for most recent flora monitoring);
- (e) use of strategically placed exclusion plots, with same size configuration as those in use in the SCER to evaluate and document non-mining related impacts to regional and site vegetation.

3. Other activities identified as areas of key concern through stakeholder engagement.

As stated elsewhere, monitoring strategies and methodologies will be performed to include similar methodologies adopted by the adjacent SCER, and in turn develop data management strategies that will also be capable of integrating, and supporting similar needs identified by the SCER Management Plan.

6.5 Biodiversity and Mine Closure

Kumtor will further integrate biodiversity aspects into all phases of the project life cycle, including: exploration, reclamation, and closure. The following represent key components that will be integrated into future CCPs, including the final closure plan required 2 years prior to closure:

- Develop feasible, sustainable and desirable post-closure land use objectives that specifically consider biodiversity and ecosystem services;
- On-going development of reclamation plan to include: native vegetation and community assemblages associated with appropriate habitat types as identified in current and future monitoring;
- Engagement with key stakeholders to identify nearby off-site important habitats degraded by anthropogenic activities – such as over grazing – that may provide more appropriate reclamation targets (conceptual approach as offsets) as compared to reclaiming high altitude “flora deserts” such as waste rock areas and pit;
- Implementation of Progressive Reclamation Strategy to include both central mining operations and exploration areas, where feasible and appropriate, with due regard to climatic and habitat limitations considering high-altitude nature of the site;
- Initiation (or continuance/ enhancement) of test plots for key habitats and vegetation community assemblages;
- Integration with native seed collection project/ herbarium support activities/ SCER interface on vegetation research/ monitoring; and reclamation activities;
- Biodiversity related closure planning to integrate with several Biodiversity Enhancements (see next Section) and components of the Biodiversity Management Strategic Plan

6.6 Climate Change

Kumtor will initiate a program to annually estimate its Greenhouse Gas (GHG) emission and adopt related Key Performance Indicators (KPI) in line with GIIP²⁴. The result of this program will be reported in Kumtor’s AERs or similar types of disclosure, including Centerra’s annual report to the Carbon Disclosure Project (CDP). In addition to continuing to provide a variety of climatic data through its on-site meteorological station, Kumtor will also consider augmenting its monitoring program to enable and support Climate Change related impact monitoring. This may include permafrost/ground conditions away from Kumtor’s immediate infrastructure (possibly within the SCER). Such an initiative would be consistent with research objectives stated in the SCER Management Plan, and could become an important regional data point for global Climate Change monitoring. This monitoring, in turn, can improve forecasting of expected impacts and related biodiversity resilience and adaption strategies.

KOC will consider supporting (and signal the availability of such support) in form of valued in-kind contributions, such as site access (accommodation) and transportation to co-funding existing/proposed programs involving academic, conservation or multilateral organizations, such as those involving UNEP

²⁴ GHG emissions in the mining industry are typically reported as a total figure (tons of CO₂ equivalent) and put into context by providing specific emission rates (based on total tons of materials mined/moved).

and others. Other options may include improving facilities at the SCER headquarters/offices and/or Ak Shyrak to make this an attractive destination for Climate Change research that can contribute to communal livelihood improvement related to visiting researchers and scientists.

6.7 Partnerships and Communications

In addition to engaging with a variety of other stakeholders, Kumtor has chosen Fauna and Flora International (FFI) as a principal partner related to Kumtor's biodiversity conservation initiatives. A formal MOU between FFI and Kumtor was signed in November 2012. Key goals and specific objectives of the MOU include that the "parties wish to cooperate on the primary objective of the delivery of biodiversity conservation and management in the Sarychat-Ertash *Zapovednik* (SCEZ – or SCER) and the wider surrounding Central Tien Shan landscape area. The MOU serves as the platform for more formal arrangements that may be required to facilitate achievement of this objective on a project-by-project basis."

As outlined in the MOU, cooperation will be focused on the following initial areas:

1. The development of a program of work to include direct support to the SCEZ and proposals for the delivery of biodiversity conservation activities across the Central Tien Shan landscape area. The scope of work is to be developed in detail following an FFI scoping mission funded by KOC.
2. Undertake a review and update of the SCEZ Management Plan and submit and champion the Plan through the Government's approval process.
3. Provide technical support to the SCEZ administration to deliver the Management Plan over the next 5 years.
4. Explore the potential for further development of mutual areas of interest relating to biodiversity conservation and management in SCEZ and the wider landscape.

A key component of FFI's activities will involve validating, finalizing and championing approval for the Management Plan of the SCER and its implementation with the staff of the SCER and other stakeholders. In addition, KOC will adopt a more structured engagement and communication program. Key elements of such a program are outlined in the following table.

Table 3: Opportunities to improve stakeholder engagement and communication channels

Key Stakeholders	Communication Vehicle	Opportunities & Comments
Government	Meetings, AER and other reporting, KOC's website, engagement and participation; KOC press releases and Kumtor Newsletters	Involve in workshops and research, participate and support UNEP-co funded national strategy development. Consider disclosure of summaries in liaison with KOC PR/Media team and include communication to KOC staff and employees through training and education.
NGOs	Annual Environmental Reports, KOC website and reporting, structured engagement; Centerra's Sustainability Report; Centerra's website	Participate in and contribute to relevant NGO workshops and networks; adopt structured engagement, such as quarterly to semi-annual meetings; assign responsibility; All grant funded programs should include requirement for brief quarterly updates and final reporting of outcomes achieved (including 1-page summary, pictures, etc..). Consider disclosure of summaries in liaison with KOC PR/Media team.
Public	Annual Environmental Reports, KOC website and reporting, Kumtor Newsletters and more frequent and routine media stories and press releases; Centerra's Sustainability Report	Inform about on-going developments and partnership activities in regular interval (not just when there is a concern). All grant funded programs should include requirement for brief quarterly updates and final reporting of outcomes achieved (including 1-page summary, pictures, etc..). Consider disclosure of summaries in liaison with KOC PR/Media team.
SCER and other Zapovedniks	Website, engagement in workshops and structured meetings (quarterly, annually)	Review availability, quality and barriers (access, resources, training, equipment) for Zapovedik-specific or centralized website to assist with dissemination of information, publications, research reports etc.. (for all KR Zapovedniks and protected areas). Consider supporting/co-funding or technical support to develop, manage and host website(s) for 3 year period.
Academic Institutions	Website, research publications, conferences	KOC to provide co-funding and support (logistics, transportation, site access/accommodation) resulting in academic journal (conference) publications; provide co-funding for conferences and events that support science-driven decision making in KR

7 Biodiversity Enhancement Opportunities

7.1 Introduction

Biodiversity Enhancement (BE) is defined as an action, or initiative, taken to improve biodiversity conservation, or protect, stabilize and/or enhance important species, assemblages, communities or ecosystems on a local or regional scale. A BE differs in principle from a Biodiversity Offset in that it is not driven by identified significant negative impacts to, or loss of, biodiversity and/or Critical Habitat (as defined by IFC Performance Standard 6).

As such, individual BE initiatives and actions can combine to form a portfolio of positive biodiversity activities for a project. In most cases, development of Kumtor's BEs will include engagement and interaction with a variety of stakeholders identified in this BMSP. Kumtor's BEs will also be aligned with the (latest) Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic (2008), and next iteration of the National Report on Biodiversity of KR and/or upcoming updates to the National Biodiversity Strategy (expected in 2013). Preliminary recommendations for the Kumtor Biodiversity Enhancement Portfolio are detailed below and are summarized in Table 4, further below.

7.2 Kumtor Biodiversity Research Center

Kumtor will develop a Kumtor Biodiversity Research Center (KBRC) to support a broader approach to biodiversity monitoring and develop relevant monitoring capacity, facilities or activities. Target initiatives of the KBRC will focus on key topics pertaining to terrestrial and aquatic ecology of the Tien Shan Mountains. Where feasible, Kumtor may provide on-site equipment, data management capabilities and other logistical support such as transportation, housing and field requirements for biodiversity monitoring. Conceptually, this initiative can also incorporate cultural heritage components of the region. KOC will also initiate an employee education and training program to explain the importance of biodiversity monitoring and conservation in general, including key species identification and strategy for a simple on-going reporting of wildlife sightings.

Principle objectives of this initiative are:

- 1) To accomplish monitoring of key biodiversity components related to Kumtor, while promoting, enabling and supporting active research on relevant biodiversity topics for the SCER and Tien Shan region.
- 2) To actively support protection, conservation and management of important species, including mammals, birds, vegetation and invertebrates.
- 3) To facilitate scientific access and logistical support to conservation activities in the western portion of the SCER and surrounding areas.
- 4) To leverage support provided by KOC with national and international sources for expansion of biodiversity research and understanding of the Tien Shan region.
- 5) To incrementally contribute to a network of facilities or initiatives that will support the accumulation of important biodiversity information through the remaining years of operation and into closure.

- 6) To interface with other long term biodiversity related initiatives, such as regional ecotourism strategy (as described in the SCER Management Plan) and other closure related opportunities, where feasible and appropriate.

KOC would also encourage a collaborative approach with international conservation and Climate Change entities, such as UNEP, NGOs and universities.

7.3 Research Focused on Regional Flora

As a core biodiversity activity, KOC will implement a monitoring and management initiative with focus on project footprint area vegetation. This process will employ a key vegetation community approach, with linkage to goals and objectives of the SCER and considers also recent efforts of KR Commissions that have established 10 monitoring stations in the project region.

The SCER management plan targets identification and surveys of vegetation communities both in the reserve and in the so-called buffer zones. KOC research and monitoring of regional flora is intended to be cooperative and synergistic with similar efforts in the region that include participation from the SCER, the KR National Academy of Sciences, the Kyrgyz State Agency for Environmental Protection, regional higher education institutions and involved stakeholders such as FFI.

The initiative will seek to build on the baseline and historic monitoring of vegetation and other programs such as collection of native seeds in the project area, and provide guidance and linkage with eventual reclamation and closure planning and other biodiversity enhancement activities as described above. KOC will also explore opportunities to support or contribute to existing regional Herbariums or collections. KOC will also seek opportunities for including community-based monitoring or involvement, in addition to long range support of regional initiatives focused on conservation and protection of the unique flora of this high altitude biome of Central Asian.

Flora monitoring and surveys will also be designed to include non-mining related regional impacts that have been cited by key stakeholders as priority concerns to maintaining ecosystem stability in the region, including impacts from overgrazing and projected implications of climate change to the vegetation communities and the forage base for key wildlife species.

7.4 Species Specific Support Initiatives

Species specific initiatives may range from in-kind contributions to on-going conservation projects or research programs such as remote sensing of argali, expansion of remote sensing projects to include ibex, wolves and others, to re-introduction of a species to a portion of its former range. KOC has a history of supporting conservation efforts for the snow leopard, and will explore ways to support newly emerging international conservation programs for this species which are expected to be hosted by Kyrgyzstan in 2013. Although the snow leopard may be the most high profile candidate, KOC will also explore supporting others species that may provide simpler and overlooked options with disproportionately large biodiversity rewards.

Species specific support programs will also target organisms identified in future research, monitoring, or studies to be in particular need of conservation assistance or reintroduction programs. Initial support

efforts will target a possible endemic species of dandelion *Taraxacum syrtorum* and *Tulipe tetraphylla* (species of tulip) found in the Kumtor project region that are believed to be largely impacted by over-harvest, agricultural practices and/or over-grazing. KOC will also contribute to National/International Species Action Plans (still in development) in conjunction with regional and international stakeholders (e.g. snow leopard and argali species action plans).

Species that may benefit from reintroduction into a portion of their native range include important prey species, such as marmots, that have been extirpated from some areas by poisoning. Another example of a species specific program is in-kind or logistical support for on-going university based remote monitoring studies with radio tags and satellite-based monitoring technologies for species such as argali, ibex, and wolves which have been identified as priorities by SCER and others.

7.5 Information Technology and Systems

Kumtor has a well-established system of data collection, processing and storing of information. This includes a myriad of technical information pertaining to project infrastructure, HSE related information, environmental data, etc. Kumtor has also access to satellite communication. Kumtor and its partners (FFI) will consider supporting the SCER and other key stakeholders to both develop a strategy to ensure biodiversity data (and important relevant abiotic data pertaining to climate change, glacier activity, water resources, soils and regional hydrology) will be compatible and capable of supporting this high priority need for SCER. The data management strategy will incorporate current GIS technologies to facilitate accessibility of information with broader scale regional and international projects. Kumtor's access to satellite communication is also a very valuable asset that could be expanded to the SCER and support associated scientific researchers and programs.

7.6 Ecotourism Strategy and Planning

Ecotourism is seen regionally as both a potential economic opportunity for the relatively poor area of Kyrgyzstan, and also as a potential threat to the mission and stated objectives of the SCER. KOC will participate as a stakeholder with SCER and others to explore ways to support regional ecotourism planning in line with legal constraints of SCER associated with its status as a *Zapovednik*. In other regions of the world, where natural resources and inherent natural values have been protected, while at the same time establishing infrastructure and capacity to allow travelers to experience regional landscapes and beauty, ecotourism has often thrived, becoming a significant part of a sustainable local or regional economy. The SCER targets several key objectives relating to ecotourism planning, including overall strategic planning, identification of acceptable "eco-tourist routes" and zoning for tourism activities.

This will be a "long range" objective that needs to start with public/community/stakeholder engagement. It will also need to coordinate and integrate with SCER activities outlined in SCER MP (to be validated and updated) and include input from local communities, "hunting camps" and appropriate government entities.

7.7 Veterinary Health of Regional Livestock

Stakeholder engagement identified an opportunity to avoid or mitigate potential risks to regional wildlife from diseases which may be present in domestic livestock that are pastured in high altitude meadows, valleys and vegetated slopes near the Kumtor Concession and the broader region. This presents also an opportunity to improve the livelihoods of those dependent on livestock by promoting vaccination and veterinary health support. KOC will consider pilot projects which seek to explore cost-effective programs aimed at researching interaction of livestock and wildlife diseases in the broader project regions and/or support (including in-kind) local vaccination of livestock. Examples of such programs that have been successful in neighboring Pakistan may provide insight for this opportunity.

7.8 Collaboration to Address Regional Biodiversity Threats

As an economic leader in Kyrgyzstan, Kumtor has an opportunity to engage as a participant with other local, national and international stakeholders to develop and implement a plan to address identified threats to regional biodiversity. Key stakeholders have confirmed that poaching and lack of institutional support (including funding for *Zapovednics*) have been, and continue to be, the main risks and barriers to broader biodiversity conservation. Other contributing factors are believed to include prevailing poverty, weak governance structures and other cultural influences. At the same time, scientific data from recent studies conducted by SCER also confirms a substantial rebound (increase) in numbers of snow leopards, Ibex and Marco Polo sheep. However, more recently, some stakeholders have raised concerns about Kumtor's exploration activities within the context of proximity to proposed "buffer zones" to the SCER, and potential impact on certain flora.

The Draft SCER Management Plan contains the following listing of specific threats to regional biodiversity:

1. Poaching of snow leopard, argali, ibex, marmot and other animals.
2. Lack of resources for study and conservation of biodiversity.
3. Global climatic changes.
4. Mining explorations – anticipated threat in future [presumably large scale mining].
5. Impact of the Kumtor Gold Mine (including those expected from closure).
6. Tourism – anticipated threat in future.
7. Overgrazing in the buffer zone and on the border with adjoining territories – anticipated threat in future.
8. Increase in the number of hunting agencies along the border with, or on close proximity, to the Reserve.

Supporting efforts aimed at controlling poaching and over-hunting, while integrating needs of local populations to satisfy cultural heritage needs that include subsistence hunting for argali ibex and other prey species is a challenging task. Stakeholder discussions identified the need to better understand the role and impact of "hunting camps" which enable trophy hunting. This often results in the elimination of the largest and potentially most ecologically fit animals out of the gene pool, unless properly managed with acceptable wildlife management methodology that can be controlled, monitored and enforced.

KOC has effectively taken a leading role in the process of controlling poaching and other impacts by prohibiting hunting on the concession and reporting hunters trying to access or enter the SCER. In collaboration with key stakeholder, KOC will consider opportunities to engage and support stakeholders and responsible government entities that are more fully engaged with this issue (such as WWF, NABU, FFI and SCER), with due regard to observing the Voluntary Principle on Security and Human Rights. Beneficial programs may include co-sponsoring a conferences or training programs aimed at incorporating best-practice wildlife management practices and/or supporting anti-poaching programs. These might include those which are currently co-funded by NABU and the German Government in the context of the Issyk-Kul Biosphere Reserve, and other programs under consideration by WWF and the SLT.

7.9 Wetland Protection and Enhancement Initiative

Wetland areas, typical of the high alpine tundra and meadows, are widespread (including within and near the Kumtor Concession). Wetland protection and/or rehabilitation or enhancement is important for two reasons. First, they can be important as a key habitat for many species of plants and animals, both resident (including some endemic species of plants) and migratory. In addition, these areas have potential to help mitigate water quality impacts which may be associated with mining activities. KOC has already initiated a program to collect native seeds for future reclamation and closure efforts. In conjunction with this effort, KOC will consider also wetland areas (within the Kumtor Concession) which might be suitable candidates for monitoring and progressive reclamation, as well as areas of importance for closure planning.

Key activities might include the following:

- a) Focus on endemic species (facultative aquatic plants - e.g. 3 species of endemic buttercup; birds and mammals that rely on wetland habitats; and others);
- b) Protection of important wildlife habitat;
- c) Monitoring of migratory birds;
- d) Enhancement, protection and/ or rehabilitation of specific wetland areas that may become effective for passive treatment of water being discharged to the environment.

7.10 Support of Regional and National Protected Areas

KOC has identified the importance of national protected areas to the stated goals and commitments of the Kyrgyz Republic through stakeholder engagement and participation in recent international biodiversity meetings and workshops hosted by the Kyrgyz Republic. In an effort to promote long term regional biodiversity stability, KOC will explore opportunities to support existing and proposed protected areas, particularly in the Central Tien Shan region where the mine is centrally located.

7.10.1 Sarychat Ertash Nature Reserve

KOC is committed to continue and expand its historic support of SCER, including operation and monitoring of the Reserve. Key objectives for this BE were identified, in part, through stakeholder engagement and as a result of Kumtor site visit to SCER and Ak Shyrak in November 2012. Initial key areas of focus will target:

- Direct Support of SCER Management Plan update and revision 2012-2013 with FFI
- Logistical Support for SCER Monitoring Activities
- Engagement of SCER staff and director to coordinate and perform wildlife and vegetation monitoring in line with SCER protocol and methodology,
- Logistical support and supplies for SCER activities, including fuel (heating), transportation and field equipment,
- Materials and equipment to upgrade SCER headquarters infrastructure on Koenduu River site
- Contribution of vehicle for SCER activities

7.10.2 Proposed Khan Tingri Nature Reserve

The KR government, through the State Agency on Environment and Forestry, with assistance from international bodies, such as the UNDP, national stakeholders (such as SCER) and leading NGOs such as FFI, WWF, ISLT and others have recently advanced the creation of a new protected area (*Zapovednik*). KOC has initiated efforts to explore opportunities to support this initiative.

7.10.3 Naryn Nature Reserve

Naryn Reserve, founded in 1983 is one of the oldest protected areas in Kyrgyzstan. Leadership from the Naryn Reserve participated with Kumtor in regional stakeholder engagement. The Naryn Zapovednik is well recognized as an important part of the Central Tien Shan protected areas network. The Naryn Reserve presently has several on-going projects that have been developed and are largely supported with limited resources and through strong dedication from the approximate 20 staff members. These include: the development of a nursery and captive breeding program for the endangered Kyrgyzstan Tien Shan maral (red deer); the establishment of the Naryn Environmental Center and Museum of Nature; and development of a local Environmental Ecotourism effort to highlight the value and unique characteristics of the regional flora and fauna. KOC will explore opportunities to support the Naryn Zapovednik in its various programs and activities.

Table 4: Summary of Proposed Kumtor Biodiversity Enhancement Portfolio

Proposed Biodiversity Enhancement- or opportunity	Broad Objective or Category of Biodiversity Enhancement ²⁵	Area of influence (refer to Figure 11 for number designation)	Potential Strategic Partners	Priority (I= high, III= Long range objective) ²⁶
Monitoring migration corridors for indicator species	Satisfying GIIP and monitoring requirements	Kumtor, SCER 2	SCER, FFI, NAS-KR	I
Incorporating Monitoring migration corridors for indicator species with SCER data	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER 2	SCER, FFI	I
Initiatives with focus on Flora: Herbarium contribution and support; support of community based regional monitoring/ baseline studies	Enhancing scientific knowledge and/or satisfying monitoring requirements	Kumtor, Regional and National 4	SCER, FFI, KR-NAS, others	I
Kumtor Biodiversity Research Center	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER 3	SCER, KR-NAS, regional and international institutions, NGOs	II and III
Incorporation of Biodiversity initiatives, goals and activities in reclamation and closure planning	Restoring habitats to increase biodiversity value	Kumtor, 1	Communities, Regional Institutions	II and III
Species specific programs and Species Action Plans: Support for ongoing radio tag studies (in-kind, or logistical)	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER, International scientific community 4	SCER, FFI, International researchers	II

²⁵ Adapted after IUCN: Integrating Mining and Biodiversity Conservation

²⁶ In general, high priority enhancements are necessary to meet monitoring needs and/ or issues raised in KR Interagency Commission Report (2011), Parliamentary Commission Report (2012) and State Commission Report (on-going). Related activities will be generally carried out during the calendar years 2013 and 2014. Medium term priority enhancements would be expected to be implemented with stakeholder participation and support over the next five years. Long terms priority enhancements are expected for later stages of the Kumtor Project and into reclamation/ closure stage.

Proposed Biodiversity Enhancement- or opportunity	Broad Objective or Category of Biodiversity Enhancement ²⁵	Area of influence (refer to Figure 11 for number designation)	Potential Strategic Partners	Priority (I= high, III= Long range objective) ²⁶
SCER Management Plan, In kind support of SCER	Supporting Protected Areas	Regional with international implications 3	SCER, FFI	I
Species specific programs that target ecosystem services, including Climate Change	Linking to on-going conservation initiatives	Kumtor, Regional 4	SCER, FFI, National and International researchers	II and III
Wetland Protection and Enhancement	Managing Natural Habitats to increase biodiversity	Kumtor 1	FFI	II and III
Engage with Stakeholders, Documenting and Addressing regional threats to Biodiversity	Linking to on-going conservation initiatives	Regional- include Cultural Heritage concerns 4	SCER, FFI, KR National Agencies	III
MOU with FFI with well-defined objectives	Direct Support of important conservation organizations in a regional context	Regional, with international 3	FFI- potentially others	I
Regional Ecotourism initiatives and development support	Integrate conservation and development initiatives that link biodiversity conservation with local social and economic development	Local Communities and National 4	SCER, FFI	III
Support of Regional Protected Areas	Supporting Protected Areas	Local, Regional, National 4	FFI, other stakeholders	II

Note: Table format adopted from IUCN Integrating Mining and Biodiversity Conservation

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Appendix 1: Legal Basis of Biodiversity Conservation in the Kyrgyz Republic (cut off 2008)

The following listing is reproduced from the latest (2008) and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic prepared for submission to the Convention Secretariat on Biodiversity.

1. The Law of the Kyrgyz Republic "On Environment Protection" as of June 16, 1999, № 53.
2. The Law of the Kyrgyz Republic "On Protected Areas[or Specially Protected Natural Territories]" as of May 28, 1994, № 1561-XII.
3. The Law of the Kyrgyz Republic "On protection and use of the vegetation" as of June 20, 2001, № 53.
4. The Law of the Kyrgyz Republic "On Environmental Expertise" as of June 16, 1999, № 54.
5. The Law of the Kyrgyz Republic "On sustainable development of environmental and economic system of the Issyk-Kul" as of August 13, 2004, № 115.
6. The Law of the Kyrgyz Republic "On Biosphere Reserves in the Kyrgyz Republic" as of June 9, 1999, № 48.
7. The Law of the Kyrgyz Republic "On Veterinary" as of March 6, 1992, № 805-XII.
8. The Law of the Kyrgyz Republic "On Fauna" as of June 17, 1999, № 59.
9. The Law of the Kyrgyz Republic "On Plant Quarantine" as of June 2, 1998, №26
10. The Law of the Kyrgyz Republic "On Licensing" as of March 3, 1997, № 12.
11. The Law of the Kyrgyz Republic "On Legal protection of selection achievements" as of June 13, 1998, № 79.
12. The Law of the Kyrgyz Republic "On Accession to the International Convention on protection of the new sorts of plants" as of January 14, 2000, № 10.
13. The Law of the Kyrgyz Republic "On Accession of the Kyrgyz Republic to the Convention on Biological Diversity" as of July 26, 1996, № 40.
14. The Law of the Kyrgyz Republic "On Accession of the Kyrgyz Republic to the Kartakhena Protocol on Biological Safety to the UN Convention on Biological Diversity" as of August 6, 2005, № 140.
15. The Law of the Kyrgyz Republic "On ratification of the UN Convention on Environmental Impact Assessment in transboundary context" as of January 15, 2001.
16. The Law of the Kyrgyz Republic "On Fishery" as of June 25, 1997, № 39.
17. The Law of the Kyrgyz Republic "On Seeds" as of June 19, 1997, № 38.
18. The Law of the Kyrgyz Republic "On Chemicalization and Plant Protection" as of January 25, 1999, № 12.
19. The Law of the Kyrgyz Republic "On basics of technical regulation" as of May 22, 2004, №67.
20. The Law of the Kyrgyz Republic "On Breeding in the livestock-breeding of the Kyrgyz Republic" as of December 18, 1992, № 1124-XII.
21. The Law of the Kyrgyz Republic "On tariffs paid for use of natural flora and fauna objects in the Kyrgyz Republic" as of August 11, 2008, №200.
22. The Law of the Kyrgyz Republic "On ban of capture, transportation, buying, selling and withdrawal of the valuable and endemic species of fish in the Issyk-Kul and Son-Kul Lakes" as of August 7, 2008.
23. The Law of the Kyrgyz Republic "On Air Protection" as of June12, 1999, №51
24. The Law of the Kyrgyz Republic "On traditional knowledge protection" as of July 31, 2007, №116
25. The Law of the Kyrgyz Republic "On Public Associations" as of October 15, 1999, №111.
26. The Law of the Kyrgyz Republic "On Jaamats (communities) and their associations" as of February 21, 2005, №36.
27. "Code of the Kyrgyz Republic on Administrative Liability" as of August 4, 1998, №114.

28. Forestry Code of the Kyrgyz Republic as of July 8, 1999, № 66 (in version of the Laws of the Kyrgyz Republic as of June 28, 2003, № 119, June 28, 2003, № 120, March 3, 2005, № 41).
29. Land Code of the Kyrgyz Republic as of June 2, 1999, №45 with amendments made in the Law of the Kyrgyz Republic as of October 17, 200, №231.
30. Criminal Code of the Kyrgyz Republic as of October 1, 1997, №68 with amendments made by the Law of the Kyrgyz Republic as of October 17, 2008, №231.
31. Decree of the President of the Kyrgyz Republic "On Introduction of the moratorium on logging, processing and selling of the valuable wood growing on territory of the forestry fund of the Kyrgyz Republic" as of November 22, 2006, УП №565.
32. Decree of the President of the Kyrgyz Republic "On Measures protecting and increasing fish stocks in the Issyk-Kul, Son-Kul Lakes and other water bodies of the Kyrgyz Republic" as of January 10, 2008, УП №.
33. Decree of the President of the Kyrgyz Republic "On Measures on extension, legal support and introduction of interaction of the state bodies, municipalities and civil society in practice in the Kyrgyz Republic" as of May 11, 2006, УП №241.
34. Decree of the President of the Kyrgyz Republic №255 as of September 4, 2000 on approval of "Concept of development of tourism sector of the Kyrgyz Republic to 2010".
35. Decree of the President of the Kyrgyz Republic as of April 30, 2005, №149 "On institutional and structural transformations in field of technical regulation in the Kyrgyz Republic".
36. Decree of the President of the Kyrgyz Republic "On improving the public administration structure of the Kyrgyz Republic" as of October 15, 2005, № 462.
37. Resolution of the Government of the Kyrgyz Republic as of September 27, 2006, №693 (in version of the Resolution of the Government of the Kyrgyz Republic as of April 11, 2008, №145) "National Action Plan of the Forestry of the Kyrgyz Republic for 2006-2010".
38. Concept of the Forestry Sector Development of the Kyrgyz Republic approved by the Government of the Kyrgyz Republic as of April 14, 2004, № 256.
39. Concept of agriculture development of the Kyrgyz Republic for 1998-2001 approved by the Resolution of the Government of the Kyrgyz Republic as of July 8, 1998, № 450.
40. Resolution of the Government "On Concept of Education Development in the Kyrgyz Republic till 2010" as of April 29, 200, №259.
41. National Programme "Jashtyk" on youth development in Kyrgyzstan till 2010. (approved by the Decree of the President of the Kyrgyz Republic as of July 18, 2000, №152)
42. The Decree of the President of the Kyrgyz Republic "On Amendments made in the Decree of the President of the Kyrgyz Republic "On Presidential Educational Programme "Personnel of XXI century" as of August 28, 2004, УП №277.
43. Concept of Environmental Safety as basic strategic document to conduct state policy on environment protection and rational nature use. Resolution of the Government of the Kyrgyz Republic as of October 16, 2007, №469.
44. Action Plan to 2010. Agenda XXI of the Kyrgyz Republic approved by the Resolution of the Government of the Kyrgyz Republic as of August 2, 2002, № 411-r.
45. National Framework Programme within the Central Asian Countries Initiative on Land Management (CACILM), 2006.
46. Concept of continue-based environmental education of the Kyrgyz Republic approved by both ministries – Education and Environment. Resolution of the Government of the Kyrgyz Republic "On Setting up the Coordination Council on Education for Sustainable Development" (11.02.2005, №74).
47. Decree of the President of the Kyrgyz Republic "On state education doctrine" as of August 27, 2000, УП №244.

48. Resolution of the Government of the Kyrgyz Republic as of June 22, 2004, № 465 "Concept of agricultural policy of the Kyrgyz Republic till 2010".
49. Regulation on State Forest Protection of the Kyrgyz Republic approved by the Resolution of the Government of the Kyrgyz Republic as of June 24, 1997, № 371.
50. Resolution of the Government of the Kyrgyz Republic "On approval of the list of priority directions of science development of the Kyrgyz Republic for 2003-2005" as of August 13, 2003, № 511.
51. Resolution of the Government of the Kyrgyz Republic "On Setting up the Coordination Council on Education for Sustainable Development" (11.02.2005, №74).
52. Resolution of the Government of the Kyrgyz Republic as of June 23, 2003, №374 "On set up of the Interagency Commission under the Government of the Kyrgyz Republic on WTO issues".
53. Resolution of the Government of the Kyrgyz Republic №369 as of July 21, 2001 "On measures on implementation of the Framework Convention on Climate Change".
54. Resolution of the Government of the Kyrgyz Republic №24 as of January 23, 1997 "On the National Commission of the Government of the Kyrgyz Republic on UNESCO matters".
55. Resolution of the Government of the Kyrgyz Republic "On Measures on use of outrun pastures of the Kyrgyz Republic" as of November 30, 1998, № 775.
56. Resolution of the Government of the Kyrgyz Republic "On approval of the regulation on leasing and use of the pastures" as of September 27, 2004, №718.
57. Resolution of the Government of the Kyrgyz Republic "On National Plan of the Kyrgyz Republic on Environment Protection of the Kyrgyz Republic" as of January 29, 1996, № 43.
58. Resolution of the Government of the Kyrgyz Republic "On implementation of the Cartagena Protocol on Biological Safety to the UN Convention on Biological Diversity" as of September 15, 2005, № 433.
59. Resolution of the Government of the Kyrgyz Republic "Concept of cooperation between the public associations, public funds, non-governmental organizations and state bodies of the Kyrgyz Republic".
60. Resolution of the Government of the Kyrgyz Republic as of April 14, 2004, №256 "On approval of the Concept of Forestry Development of the Kyrgyz Republic till 2025".
61. Resolution of the Government of the Kyrgyz Republic №161 as of April 22, 2008 "On approval of the Fishery Development Programme of the Kyrgyz Republic for 2008-2012".
62. Resolution of the Government of the Kyrgyz Republic №310 as of July 25, 2005 "On status of the Chatyr-Kul Lake as a wetland having international importance".
63. Resolution of the Government of the Kyrgyz Republic №901 as of December 30, 2006 "On control and surveillance of safety measures in field of veterinary, plant quarantine, epidemiology, sanitary and environment conducted by the state authorities".
64. Resolution of the Government of the Kyrgyz Republic "On Country Development Strategy for 2007-2010" as of March 23, 2007, №84.
65. Resolution of the Government of the Kyrgyz Republic as of February 2, 2001, №33 and Resolution of the Government of the Kyrgyz Republic as of January 28, 2003, №38 "programme on Tourism Development in the Kyrgyz Republic to 2010".
66. Resolution of the Government of the Kyrgyz Republic №802 as of November 25, 2002 "Action Plan on implementation of proposals on comprehensive tourism development in the Issyk-Kul region".
67. Resolution of the Government of the Kyrgyz Republic as of October 18, 1996, №332 "Concept of environmental safety of the Kyrgyz Republic".
68. Resolution of the Government of the Kyrgyz Republic as of August 3, 2002, № 524 "On approval of the Biodiversity Conservation Strategy of the Kyrgyz Republic".
69. Resolution of the Government of the Kyrgyz Republic as of January 24, 2000, №40 "On approval of the regulation on the Biosphere Reserve Issyk-Kul".

70. Resolution of the Government of the Kyrgyz Republic as of September 27, 2006, №693 On approval of the National Action Plan of the Forestry Development of the Republic for 2006-2010".
71. Resolution of the Government of the Kyrgyz Republic as of November 17, 2001, №715 "On approval of the State Programme "Forest" for 2001-2005".
72. Resolution of the Government of the Kyrgyz Republic as of April 28, 2005, №170 "On approval of the list of rare and endangered species of animals and plants for their inclusion in the Red Book of the Kyrgyz Republic".
73. Resolution of the Government of the Kyrgyz Republic as of April 11, 2008, № 145 "On the National Forest Inventory".
74. Decision of the Security Council of the Kyrgyz Republic "On status, draft concept and measures ensuring environmental safety of the Kyrgyz Republic" as of August 4, 1997.
75. Directive of the State Agency on Environmental Protection and Forestry under the Government of the Kyrgyz Republic as of August 6, 2007, №01-13/180 "On approval of the Strategy and Action Plan on development of the electronic informational resources in the forestry sector of the Kyrgyz Republic".
76. Directive of the Ministry of Agriculture, Water Resources and Processing Industry of the Kyrgyz Republic "On import procedure of the agricultural culture seeds, which are not included in the State Register of the Kyrgyz Republic, sorts and hybrids zoned and allowed to be seeded" as of February 19, 1998, № 42.

Appendix 2: International Conventions and Agreements (cut off 2008)

The following listing is reproduced from the latest (2008) and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic prepared for submission to the Convention Secretariat on Biodiversity.

Conventions:

1. Convention on protection of the World Cultural and Natural Heritage (1995)
2. Convention on Biological Diversity (1996)
3. Convention on Combating Desertification in the countries facing severe draught and/or desertification especially in Africa (1999)
4. Convention on transboundary air pollution on long distances (2000)
5. Convention on Environmental Impact Assessment in transboundary context (2001)
6. Convention on access to information, public participation in decision-making process and access to justice on issues related to environment (2001)
7. Convention on Wetlands having international importance mainly as habitats of the waterfowl (Ramsar) (2002)
8. UN Framework Convention on Climate Change (2000)
9. Kyoto Protocol to the UN Framework Convention on Climate Change (2003)
10. Cartagena Protocol on Biological Diversity to the UN Convention on Biological Diversity (2005)
11. UN Convention on International Trade of Endangered Species (CITES) (1973)
12. Stockholm Convention on Persistent Organic Pollutants (2002)
13. Rotterdam Convention on procedure of preliminary sound agreement in terms of specific hazardous chemicals and pesticides in international trade (2002)
14. UN Convention on protection new sorts of plants (2000)
15. Basel Convention on control of transboundary transportation of hazardous waste and its removal (1996)
16. Convention of the European and Mediterranean organization on plants protection (ratified by the Resolution of the Government of the Kyrgyz Republic as of April 12, 1999, № 214)
17. Vienna Convention on ozone layer protection and Montreal Protocol on depleting substances (2000)

Agreements:

18. Agreement on partnership and cooperation between the European Community and its states-members from one hand and the Kyrgyz Republic from other hand as of 09.02.1995, Brussels (ratified by Law of the Kyrgyz Republic as of 05.07.1997, № 43);
19. Agreement between the Government of the Kyrgyz Republic, the Government of the Republic of Uzbekistan and the Government of the Republic of Kazakhstan on Cooperation in field of conservation of biodiversity of the Western Tien-Shan as of 17.03.1998, Bishkek (signed by the Prime-Minister of the Kyrgyz Republic on 17.03.1998);
20. Agreement on Intention between the Interstate Sustainable Development Commission (ISDC) and the Central Asian WWF Programme on implementation of "Econet" in the region. ISDC's decision №3 as of November 16, 2007, Bishkek.
21. Agreement between the CIS countries on cooperation in field of plant quarantine as of November 13, 1992, Moscow (signed by the Prime-Minister of the Kyrgyz Republic on November 13, 1992);

22. Agreement between the Ministry of Agriculture, Water Resources and Processing Industry of the Kyrgyz Republic and the Ministry of Agricultural Policy of Ukraine on Cooperation in field of testing and protection of the plant sorts (Kiev, March 28, 2003).
23. Agreement between the Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic, the Government of the Republic of Tajikistan and the Government of the Republic of Uzbekistan on Cooperation in field of plant quarantine as of June 8, 2000, Astana (signed by the Prime-Minister of the Kyrgyz Republic on June 8, 2000).
24. Agreement on Cooperation in field of environmental protection (the Almaty's Declaration of the Presidents of Central Asia, 1997; the Tashkent's Declaration of the Special UN Programme for Central Asia, 1998; the Dushanbe's Declaration, 2002).
25. Agreement between the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and the Republic of Uzbekistan on Cooperation in field of integrated management in use and protection of interstate water resources (1992).
26. Agreement on Cooperation in emergency prevention and mitigation between the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and republic of Turkmenistan (1997).
27. Agreement TRIPS within WTO (1998)
28. Agreement on Sanitary and Phytosanitary control within WTO (1998)

Appendix 3: Summary of 19 October 2012 Biodiversity Focus Group Meeting in Bishkek (English)

Summary Document for Kumtor Operating Company Biodiversity Strategy workshop Prepared by Fauna & Flora International in the Kyrgyz Republic (26 November 2012)



On 19 October 2012, “Kumtor Operating Company” (KOC) and “PRIZMA” LLC held a workshop entitled “Development of Biodiversity Strategy” in Bishkek, Kyrgyzstan. This involved a wide range of stakeholders, including representatives of state, academic and non-governmental institutions, as well as international conservation organizations (see attached program and list of participants).

Presentations by the Participants and Discussion

The workshop was opened by **Mr. Ben Ferris**, Director for Environment of KOC and facilitated by **Mr. Mehrdad Nazari**, Director of “Prizma” LLC. The aim of the seminar was to discuss the development of KOC’s Biodiversity Strategy. Taking into consideration KOC’s planned closure in 2021, the company has set a goal of ensuring that biodiversity value and continued collaboration remain high on the agenda in its compliance, enhancement and global strategy orientation. Thus, the organizers outlined three main directions for the Biodiversity Strategy:

- further integration of biodiversity conservation in the environmental and closure planning;
- seeking net-positive conservation measures; and,
- collaboration and cooperation with stakeholders.

According to Mr. Nazari, the KOC Biodiversity Management Strategy and Plan is intended to cover KOC’s licensed area, but would also consider including a larger region to ensure its effectiveness and to avoid missing possible collaboration opportunities. The Kumtor-Biodiversity Management Plan is to be completed before the end of 2012. Mr Nazari also emphasized that the Plan is intended to seek shared solutions to biodiversity conservation among stakeholders, while seeking opportunities for positive impacts and interactions.

KOC’s readiness to develop its own Biodiversity Strategy received warm welcome from participants. The workshop participants recognized that whilst KOC operated within a framework of international environmental standards, the mining industry in general is intrinsically disruptive to eco-systems, which often cannot be restored to their original state following mine closure. It was noted that the Rio +20 Conference has recently demonstrated that despite global efforts to protect nature, no country in the world has achieved significant progress in halting the loss of nature. It was agreed that Kyrgyzstan, a

signatory of many international conventions, finds itself in a similar situation. The national-level Biodiversity Strategy developed in 1995 has not been effectively implemented.

The first guest speaker, **Professor Emil Shukurov**, prominent scientist and the Director of the ecological movement “Aleyne”, suggested that the Biodiversity Strategy should be systematic and complex. Prof. Shukurov prefaced his comments with general concerns about the mining industry posing a threat to nature and also criticism about any country’s hopes for development relying solely on supply of natural resources. Professor Shukurov also began by stating that the fact that KOC will develop a Biodiversity Management Plan is a productive step and could contribute toward developing a new National cause for Biodiversity Conservation, in light of the fact that despite creation of Nature Reserves, passing laws, etc. “nature continues dying”. He then highlighted a brief history of the KR National Biodiversity Plan – and emphasized that “actions and good examples are needed to demonstrate commitment to biodiversity conservation”, moving to concrete ideas and proposals that adopt a systematic, ecosystem approach that protect habitats and ecosystems in a comprehensive manner – instead of focusing on only species. Prof. Shukurov also expressed his deep concern regarding hunting concessions in the vicinity of the Kumtor mine and the Sarychat-Ertash State Reserve (SESR). Remembering expeditions held in the 1950s, when he was able to observe herds of argali thousands strong, he noted that there were no such herds left. Prof. Shukurov believes that hunting agencies should be improving livelihoods of local communities; however, this is not the case. Hunting agencies are practically engaged in exploitation of wildlife resources. Other threats to biodiversity include competition through overgrazing, loss of food base, and the spread of infectious diseases via contacts with domestic animals leading to weakening of populations of ungulates.

At the same time, the Prof. Shukurov pointed towards means of addressing these issues, which were not always costly and recommended looking for simple solutions that use “natural processes”. He recommended conservation efforts for forested areas which hold half of the biodiversity of KR, but occupy only 17% of the area of the country. For example, reforestation could be achieved, not through planting new trees, but through fencing, since nature has very powerful regeneration resources and is able to restore itself if adequately protected.

He also emphasized the importance of pasture ecosystems and an important task is to identify natural ecosystems as genetic reserves, managing for “correct use” and including all components, including herbs, forbs, invertebrates, etc. He suggested that terracing could be used to improve quality of grassland and reduce erosion.

Prof. Shukurov recommended conservation directions that enable “maximum participation with the maximum number of stakeholders”. Professor Sukurov also introduced the concept of “Micro-Reserves” and/ or “demonstration plots” that involve working with local communities, especially youth groups, re-iterating the need for support groups within the general population.

He also recommended vaccination programs for livestock and guarding dogs, creation of a small public council and having “advisors” to settlements, creation of jobs – such as planting of quick growing trees, or culturing of plants used for indigenous handicrafts, creation of various forms of Co-ops, and continuous awareness raising work about the importance of the environment and conservation.

The overall approach, according to Prof. Shukurov, should be ecosystem based rather than focused on particular species.



Mr. Kylychbek Jundubaev, Senior Biodiversity Specialist from the State Agency of Environmental Protection and Forestry under the Government of the Kyrgyz Republic, gave a clear overview of the Agency's work and also informed participants about Agency restructuring planned for 2013. Mr. Jundubaev pointed out that continuous changes of status, and restructuring of the institution, has been the major reason for weak biodiversity conservation to date. This has impacted not only on KOC's neighbor, the SESR, but also other nature reserves and national parks. The number of specialists in the Department of Specially Protected Areas and Biodiversity Protection within the Agency has decreased from 7 to 2 in the last few years. Frequent changes in senior management, lack of staff and limited capacity, are some of the reasons causing delay in approval of such documents as the SESR's Management Plan. Mr. Jundubaev reassured participants that the Agency highly respected its partners' initiatives; however, these kinds of factors sometimes prevented the adoption of excellent documents.

Mr. Jundubaev also stated that a government discussion of "SCER buffer Zones" will be addressed in the upcoming National Biodiversity Action Plan (2013). He expected (some form) of the KOC biodiversity plan to be included as an appendix to the new National Action Plan.

He also recognized the need for National inventories of all "zapovedniks and national parks, and the urgent need for biodiversity monitoring", also stating he was happy to see actions taken by KOC to include environmental monitoring (land, air, water) in addition to complex monitoring of biodiversity.

He also stated a specific need to identify "routes of migration" and mechanisms of assessment within the framework of Socio-economic development; a priority to look at ecosystem functioning; addressing issues arising from Protected areas located near sub-soil resources; and synergy of geological and environmental issues. Mr. Jundubaev closed in stating that he hoped Kumtor's biodiversity management plan would serve as an example for other industry in KR.

Director of the Kyrgyz branch office of the UK-based conservation organization Fauna & Flora International (FFI), **Ms. Jarkyn Samanchina**, shared the organization's experience in biodiversity conservation efforts in Central Asia and China. She particularly emphasized FFI's global corporate partnership experience encompassing almost 40 countries where FFI implements its programs. In Kyrgyzstan, in 2005–2008, together with its local partners, FFI implemented the first Technical Cooperation project titled "Institutional Capacity Building for Biodiversity Conservation in Kyrgyzstan". The project was funded by the European Bank for Reconstruction and Development, International Finance Corporation, and KOC. The project focused on the SCSR and included several main components, such as: 1) strengthening the material and technical base of the Reserve; 2) developing an anti-poaching strategy; 3) developing a biodiversity monitoring strategy; 4) developing the SESR Management Plan; and, 5) improving livelihoods of local communities through a targeted Small Grants Program.

This project was an excellent example of cooperation and yielded many positive outcomes with relatively modest funding. Ms. Samanchina stated that despite the Reserve's Management Plan not having been officially adopted by the State Agency, it had been a good tool for the Reserve's organizational development and had enabled progress with their biodiversity conservation work. However, as the Management Plan was developed more than 5 years ago, it now required revisiting, updating and most importantly, support to implement management actions.

She expressed FFI's openness for future collaboration within that scope of work, and noted that this approach would "need continuity" and also require long-term planning "with greater detail" to achieve maximum efficiency.

Deputy Director of the SESR, **Mr. Alexander Vereschagin**, informed participants about the Reserve and its work, including details of past projects implemented with FFI and Snow Leopard Trust. Mr. Vereschagin highlighted results of over 140 expeditions, the significant restoration of the forage base (within the Reserve); and detailed increases in numbers of argali, ibex and snow leopards (now 18 within the SCER boundaries), showing increases in populations of "all key species". He also shared updates on some more recent activities on radio-collaring of ungulates together with Japanese scientists, and steps towards developing the economic self-sustainability of the Reserve with support from WWF. Mr. Vereschagin spoke of good historic relations between KOC and SCER, citing only a recent (2010-2012) dispute over buffer zones. According to Mr. Vereschagin, the territory of the Reserve has been reevaluated using GIS and is the core area is 62,060 ha. In his interpretation, including buffer zones, the Reserve is now believed to be 149,117.9 hectares. The Reserve is also intended to become a corridor to link with a soon-to-be-established new Reserve – *Khan Tengri*. Echoing Prof. Shukurov's concerns about hunting concessions, including pressure from "hunting farms" – suggesting control of "single point of access for hunting",

Mr. Vereschagin mentioned that the people of Ak-Shyirak Village, situated near the Reserve and where most of the rangers lived with their families, did not have its own hunting territory. The land around the village has been bought and is now under private ownership, a violation of local people's rights. Mr. Vereschagin believes that following successful examples from Pakistan, pilot community-based hunting could be implemented in the villages of Ak-Shyirak and Enilchek. Interestingly, the number of ungulates has increased in the recent years despite, or, perhaps, thanks to the presence and guarding measure undertaken by the Kumtor mine. Other issues raised in his presentation included the need for species inventory, improvement of the material and technical base of the Reserve, and, most importantly, more information, awareness, advertising work about the Reserve and the importance of biodiversity conservation work among local community members, as well as broader public.

Mr. Vereshagin also discussed future needs, including: remote sensing (photo traps and radio collars) for ibex and wolves; the pressing need to document and identify migration routes; the creation of a data base; and general lack of resources for the Reserve and staff that has been stated elsewhere.

Mr. Vereshagin asked the rhetorical question “what will happen when Kumtor leave?” and was also keen to emphasize the great opportunities for SCER and Kumtor working together on several fronts, including opportunities with regard to “co-finance” for mutual activities with outside researchers and institutions. Finally, Mr. Vereshagin made a general request for Kumtor support for joint work to preserve the “Natural Wealth” of KR, which belongs to all the people.



Discussions among all the participants, following Mr. Vereshagin’s presentation then identified several “Key Problems” pertaining to biodiversity on the National level:

- Hunting Farms
- Logistical Support of protected areas
- Common research goals and strategies
- Maintenance of “ecological corridors”
- Impacts to water
- Preservation of flora and fauna

Mr. Joldoshbek Kyrbashev, Deputy Director of the Naryn State Reserve, gave a very informative presentation about the Reserve's work, including the most recent activities supported by FFI: the baseline surveys in zoology, hydrobiology, entomology, and botany, carried out jointly with specialists from the National Academy of Sciences of the Kyrgyz Republic; and training to help develop a biodiversity monitoring strategy.

The Naryn Reserve's second Deputy Director, **Mr. Orozbek Aliev**, shared with participants the concern felt by residents of the Naryn Region about the Naryn River's change of color and its lack of freezing during the winter. People in Naryn often assume that these changes are caused by KOC's mining activities, and believe that further research is needed to get to the bottom of this issue. He also mentioned the Reserve's lack of a laboratory, which prevents them from performing water quality tests. This question was addressed by Mr. Ferris, who assured the participants that these observed changes could be caused by several other factors, such as city garbage/pollution, but not by Kumtor, which is situated a significant distance from Naryn. He also stressed that KOC worked in accordance with international standards and complied with all regulations.

Mr. Kyrbashev also highlighted several successful initiatives currently underway with the Naryn Reserve, including: the Nursery activities for endangered red deer; the Naryn Environmental Center and Museum of Nature; Environmental eco-tourism efforts to show the unique flora and fauna, yet also stated some of the similar problems stated elsewhere in the workshop - including low salaries and lack of resources and staff; pressures from hunting- including foreign trophy hunting; and general concerns over water quality.

Dr. Georgy Lazkov, Leading Specialist in botany from the National Academy of Sciences, in his presentation about the flora around the Kumtor area, said that there were 205 plants from 30 families found in the area, including only 4 trees in the form of shrubs and semi-shrubs. In the SCER area, there are just over 500 plants. Overall, the flora in the area around Kumtor and in SCER is very depauperate due to severe climate and long winters. It is not unique and very typical of the Central Tien Shan, including China and Kazakhstan. There is only one Red Data Book species, *Tulipa tetraphylla*, actually collected in Barskoon Village area (and noted that this species is, in fact, more widely distributed in the Central Tien Shan region). Dr Lazkov also discussed another "endemic" species of dandelion- that may also have a wider distribution in the Central Tien Shan region.

However, he noted the Red Data Book is lacking in data on many plant species, and it is possible that there are other rare plants in the region. Dr. Lazkov suggested that after the mine closure, it would be very worthwhile to plant seeds of dominant species from native species of vegetation, using an ecosystem approach. It is important to make sure these seeds are from the local area, and not brought from elsewhere, because that would create anthropogenic communities which either cannot grow or, if successful, create problems for the area in future.

In discussions following Dr Lazkov's presentation Professor Shukurov recommended that Kumtor reclamation efforts should also focus on conservation of productive ecosystems, rather than solely focusing on areas with high environmental impact, such as waste rock areas.

Mr. Bakytbek Satybekov, Director of Central Asia Regional Environmental Center (CAREC), provided an overview of the organization's work, which focused on nature preservation; best industry practices; multi-stakeholder dialogues - especially trans-boundary water issues; GAP analysis of Climate Change; and water and energy efficiency. He said that although CAREC did not have projects directly related to

biodiversity conservation, it worked on the National Plan on Climate Change Adaptation, and had also worked directly with several projects in the Issyk-Kul, including some 57 youth organizations and smaller projects to raise environmental awareness, such as cleaning of beaches.

Mr. Tolkunbek Asykulov, Director of the Kyrgyz branch office of the German nature protection organization NABU, talked about general activities in the Issyk-Kul Biosphere Reserve, including: monitoring, ecotourism, rehabilitation of environments, tracking numbers of birds in the Issyk-Kul area; and the organization's snow leopard protection activities in Kyrgyzstan, including awareness raising, community work, collaboration with law enforcement agencies, and NABU's special group of enforcement officers (anti-poaching group), known as "*Gruppa Bars*" ('snow leopard group'). Mr. Asykulov also informed the participants about the upcoming Snow Leopard Forum to be held in the summer of 2013 in Bishkek, and the steps being taken to organize this event.

Exercises during the Workshop

During the course of the workshop, in addition to discussions during and following presentations, the participants collaborated in several individual and group exercises.

The first, a warm-up exercise, was aimed at developing a model cover page for the future KOC Biodiversity Strategy document. Participants individually chose from a list of choices and constructed their own models to recommend to KOC and explain how and why KOC's Biodiversity Strategy cover page should be different from the country's Biodiversity Strategy cover page. The list of choices included: 1) map (description), 2) mining industry (description), 3) the Marco Polo sheep, 4) snow leopard, 5) ibex, 6) flora (title/description), 7) local community (title/description), 8) climate change (description), and 9) other.

The second exercise was done in two groups. The workshop participants were asked to answer 2 questions: 1) name 3 areas with significant lack of information for KOC's future Biodiversity Strategy, and 2) name 3 areas with significant lack of information in the Kyrgyz Republic's Biodiversity Strategy. Both groups found many similarities on information gaps for both documents.

The first group identified the following gaps for both strategies:

- lack of awareness about what biodiversity is and lack of up-to-date/truthful information about its state;
- lack of information about funding needs and the costs of biodiversity protection measures; the need for more money to be invested into awareness work in the first 3 years to pave the way for future work; the need to create public committees which would decide how resources must be spent;
- lack of information about local communities and their socio-economic situation (e.g.: stratification, poverty level, how the situation is changing, why people are forced to compensate at nature's expense, etc.);
- lack of information about test results on water and air quality, and other tests — this information should be made available to the public;

- lack of information about the plans of the mining industry – decisions must be made in agreement with specially protected areas (e.g. which territories will be affected); and,
- lack of monitoring activities on the part of the Government, although funds for such activities are budgeted.

The second group, in addition to above answers, also suggested the following:

- lack of ecosystem research – it is not possible to observe overall dynamics;
- lack of publicity – research results should be widely publicized; and,
- lack of information about the state of flora and fauna – there is no unified monitoring center.

The third exercise asked participants to give their final recommendations to KOC to consider in developing its Biodiversity Strategy document. The following recommendations were given:

- KOC is to pay attention to biodiversity;
- conduct regular monitoring of environmental and economic aspects of the mining industry;
- support the updating and approval of the SESR's Management Plan; support the implementation of the Plan; and, help to bring the Reserve to a world class level;
- include the broader ecosystem, especially the Naryn Reserve, in KOC's Biodiversity Strategy;
- conduct active research and provide proper coverage of scientific results in the mass media;
- support the training of existing and future specialists in biodiversity;
- collaborate with local communities; implement KOC's own grant program; and, implement projects on strengthening monitoring work; and,
- disregard political motives and be open towards collaboration and partnership;
- understand the context and fulfill expectations.

The workshop organizers summarized the workshop discussions and thanked all participants for active participation. An announcement was made that all materials presented and developed at the workshop would be made available to all on a CD or memory stick.

In closing of the meeting, Professor Shukurov stated that the workshop provided a "good discussion" with much constructive thinking and little conflict of opinion. He recommended several separate major directions for the stakeholders to pursue, including:

A cooperative effort relating to biodiversity with local communities, and with the assistance of stakeholders and experts to address conservation of important ecosystem, within the framework of "Project(s)" including participation of Kumtor and other entities;

Strengthening of biodiversity monitoring with the assistance of experts using appropriate indicators; and

Implementation of specific (biodiversity) programs within the National legal framework, including institutions and public participation with clear goals and objectives.

Appendix 4: Program and Participants of Kumtor's October 2012 Biodiversity Focus Group Meeting

Program: Workshop "Development of Biodiversity Strategy"; Location: "Zolotoi Drakon" Hotel, Date: 19 October 2012, Organizers: "Kumtor Operating Company" and "Prizma" LLC

Time	Presentation
9.00	Workshop Welcoming Speech by Ben Ferris, Environment Director, KOC, and Mr. Mehrdad Nazari, Director, Prizma
9.20	Speech by Prof. Emil Shukurov <i>"Cooperation with Mining Industry for Conservation of Biodiversity in the Kyrgyz Republic"</i> (includes 10 minutes for Q&A and discussion)
9.55	Presentation by Mr. Kylychbek Jundubaev <i>"The Impact of Mining on Biodiversity"</i> (includes 10 minutes for Q&A and discussion)
10.30	Presentation by Ms. Jarkyn Samancina <i>"FFI's Activities and Experience Working in the Kyrgyz Republic, including Cooperation with EBRD, IFC, and KOC"</i> (includes 10 minutes for Q&A and discussion)
11.05	Presentation by Mr. Ishemkul Asakeev and Mr. Alexander Verschagin <i>"Activity of the Sarychat-Ertash Reserve for Conservation of Biodiversity"</i> (includes 10 minutes for Q&A and discussion)
11.40-12.00	Coffee- break
12.00	Presentation by Orozbek Aliev and Joldoshibek Kyrbashev <i>"Activity of the Naryn Reserve for Conservation of Biodiversity"</i> (includes 10 minutes for Q&A and discussion)
12.35	Speech by Dr. Georgy Lazkov <i>"State of Flora around the Kumtor Mine"</i> (includes 10 minutes for Q&A and discussion)
13.05-14.00	Lunch
14.00	Presentation by Mr. Bakytbek Satybekov <i>"Activity of CAREC in Kyrgyzstan"</i> (includes 10 minutes for Q&A and discussion)
14.35	Presentation by Mr. Tolkunbek Asykulov <i>"Activity of NABU in Kyrgyzstan"</i> (includes 10 minutes for Q&A and discussion)
15.05-15.25	Coffee- break
15.25-16.30	Workshop Summary and Closing

List of Participants

1. Emil Shukurov – Professor , Director of Environmental Movement “Aleyne”
2. Kylychbek Jundubaev– Senior Biodiversity Specialist, Specially Protected Areas and Biodiversity Protection Department, State Agency of Environmental Protection and Forestry under the Government of the Kyrgyz Republic
3. Ishenkul Asakeev – Deputy Director of the Sarychat-Ertash State Reserve
4. Alexander Vereschagin – Deputy Science Director of the Sarychat-Ertash State Reserve
5. Orozbek Aliev – Deputy Director of the Naryn State Reserve
6. Joldoshbek Kirbashev - Deputy Science Director of the Naryn Reserve
7. Dr. Georgy Lazkov– Leading Specialist of the Flora Laboratory, Institute of Biology and Soil, National Academy of Sciences of the Kyrgyz Republic
8. Jarkyn Samanchina – Director, Fauna & Flora International – Kyrgyzstan
9. Tolkunbek Asikulov – Director, NABU – Kyrgyzstan
10. Bakytbek Satybekov– Director, CAREC – Kyrgyzstan
11. Dr. Don Proebstel, Senior Biodiversity & ESIA Advisor, “Prizma” LLC
12. Mehrdad Nazari, Senior ESIA & CSR Advisor, Director, “Prizma” LLC
13. Douglas Grier – Director, Sustainable Development, KOC
14. Eric Kojomkulov – Health, Safety & Environmental Systems Manager, KOC
15. Ben Ferris - Director, Environment, KOC
16. Aibek Abduvaliev- Manager, Environment, KOC
17. Uran Junusov – Coordinator, Sustainable Development, KOC
18. Aygerim Dyikanbaeva - Coordinator, Sustainable Development, KOC

Appendix 5: Plant Species found in the region of the Kumtor Mine Site (G. Lazkov, 1992)

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
1	Alliaceae J. Agarrdh.	Onion Family	Луковые
1	<i>Allium atrosanguineum</i> Kar. et Kir.	Red-and-black Onion	Лук черно-красный
2	<i>A. platyspathum</i> Schrenk	Amblyophyllous Onion	Лук широкочехольчатый
3	<i>Allium semenowii</i> Regel	Semenov's Onion	Лук Семенова
2	Asteraceae Dumort.	Aster Family	Астровые
4	<i>Ajania scharnhorstii</i> (Regel et Schmalh.) Tzvel.	Scharnhorst's Ajania	Аяния Шанхорста
5	<i>Artemisia aschurbajewii</i> C. Winkl.	Ashurbaev's Wormwood	Полынь Ашурбаева
6	<i>A. dracunculus</i> L.	Silky Wormwood	Полынь эстрагон
7	<i>A. rhodantha</i> Rupr.	Rose-colored Wormwood	Полынь розовоцветковая
8	<i>A. viridis</i> Willd.	Summer-fir	Полынь зеленая
9	<i>Aster alpinus</i> L. s. l.	Alpine Aster	Астра альпийская
10	<i>Cirsium esculentum</i> (Stev.) C. A. Mey.	Ground Thistle	Бодяк съедобный
11	<i>Crepis multicaulis</i> Ledeb.	Many-stemmed Hawk's-beard	Скерда многостебельная
12	<i>C. karelinii</i> M. Pop. et Schischk.	Karelina Hawk's-beard	Скерда Карелина
13	<i>Erigeron aurantiacus</i> Regel	Orange Fleabane	Мелколепестник оранжевый

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
14	<i>E. azureus</i> M. Pop.	Azure Fleabane	Мелколепестник лазоревый
15	<i>E. heterochaeta</i> (Clarke) Botsch.	Hetero-bristle Fleabane	Мелколепестник разнощетиный
16	<i>E. lachnocephalus</i> Botsch.	Eriocephalous Fleabane	Мелколепестник шерстистоголовый
17	<i>Inula rhizocephala</i> Schrenk	Rhizocephalan Inula	Девясил корнеглавый
18	<i>Leontopodium ochroleucum</i> Beauverd	Pale Yellow Edelweiss	Эдельвейс бледно-желтый
19	<i>Ligularia alpigena</i> Pojark.	Alpine Ligularia	Бузульник альпийский
20	<i>Pyrethrum karelinii</i> Krasch.	Pyrenthrum Karelina	Ромашник Карелина
21	<i>Pyrethrum pyrethroides</i> (Kar. et Kir.) Krasch.	Himalayan Chrysanthemum	Ромашник ромашковидный
22	<i>Rhinactinidia limoniifolia</i> (Less.) Botsch.	-	Ринактинидия кермеколистная
23	<i>Saussurea leucophylla</i> Schrenk	Proud Saw-wort	Горькуша серебристолистная
24	<i>S. sordida</i> Kar. et Kir.	Sordid Saw-wort	Горькуша грязноцветковая
25	<i>S. gnaphalodes</i> (Royle) Sch. Bip.	Cudweed Saw-wort	Горькуша сушеницевидная
26	<i>S. glacialis</i> Herd.	Icy Saw-wort	Горькуша ледниковая
27	<i>Taraxacum leucanthum</i> (Ledeb.) Ledeb.	Albiflorous Dandelion	Одуванчик белоцветковый
28	<i>T. maracandicum</i> Kovalevsk. (= <i>T. pseudoalpinum</i> Schischk. ex Orazova)	Samarkand Dandelion	Одуванчик самаркандский

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
29	<i>T. syrtorum</i> Dshanaeva	Syrt Dandelion	Одуванчик сыртовый
30	<i>T. sp.</i>		
31	<i>Waldheimia tomentosa</i> (Decne.) Regel (<i>W. stoliczkae</i> (Clarke) Ostenf.)	White-Leaf Ground Daisy	Вальдгеймия войлочная
32	<i>W. tridactylites</i> Kar. et Kir.	Three-blade Daisy	Вальдгеймия трехлопастная
3	Athyridaceae Alst.	Spleenwort Family	Антириевые
33	<i>Cystopteris fragilis</i> (L.) Borb.	Bladder Fern	Пузырник ломкий
4	Boraginaceae Juss.	Borago Family	Бурачниковые
34	<i>Eritrichium villosum</i> (Ledeb.) Bunge	Villous Forget-me-not	Незабудочник мохнатый
35	<i>Myosotis ? alpestris</i> F.W. Schmidt	Alpine Forget-me-not	Незабудка ? альпийская
5	Botrychiaceae Horan.	Grape-fern Family	Гроздовниковые
36	<i>Botrychium lunaria</i> (L.) Sw.	Moonwort	Гроздовник полулунный
6	Brassicaceae Burnett	Cabbage Family	Капустные
37	<i>Braya rosea</i> Bunge	Rose Rock-cress	Брайя розовая
38	<i>B. scharnhorstii</i> Regel et Schmalh.	Sharnhorst Rock-cress	Брайя Шарнхорста
39	<i>Chorispora bungeana</i> Fisch. et C. A. Mey.	Blue Mustard	Хориспора Бунге
40	<i>C. songarica</i> Schrenk	Djungaria Mustard	Хориспора джунгарская

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
41	<i>Dilophia salsa</i> Thoms.	-	Двукильник солончаковый
42	<i>Draba altaica</i> (C. A. Mey.) Bunge	Altaic Whitlow Grass	Крупка алтайская
43	<i>D. ochroleuca</i> Bunge	Yellow-white Whitlow Grass	Крупка желто-белая
44	<i>Draba oreades</i> Schrenk	Mountain Whitlow Grass	Крупка горная
45	<i>D. subamplexicaulis</i> C. A. Mey.	Sub-Stem-clasping Whitlow Grass	Крупка почти стеблеобъемлющая
46	<i>Eutrema edwardsii</i> R. Br.	Edwards's Mock Wallflower	Эвтрема Эдвардса
47	<i>Hedinia tibetica</i> (Thoms.) Ostenf.	Tibetan Hedinia	Хединия тибетская
48	<i>Lepidium apetalum</i> L.	Apetalous Cress	Клоповник безлепестный
49	<i>Neotorularia humilis</i> (C. A. Mey.) Hedge et J. Leonard	Low Northern Rock-Cress	Неоторулярия низкая
50	<i>Oreoblastus flabellatus</i> (Regel) Suslova	Suslov's Flabellate Oreoblastus	Ореобластус веерный
51	<i>Sisymbriopsis mollipila</i> (Maxim.) Botsch.	Soft-hair (silky-hair) Sisymbrium	Гулявничек мягковолосый
52	<i>Smelowskia calycina</i> (Steph.) C. A. Mey.	American False Candytuft.	Смеловския чашечная
53	<i>Sophiopsis annua</i> (Rupr.) O. E. Schulz	-	Софийка однолетняя
54	<i>Sisymbrium brassiciforme</i> C. A. Mey.	Himalayan Tumble-Mustard	Гулявник купустовидный
55	<i>Taphrospermum altaicum</i> C. A. Mey.	-	Ямкосемянник алтайский
7	Campanulaceae Juss.	Bellflower Family	Колокольчиковые

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
56	<i>Adenophora himalayana</i> Feer	Himalayan Ladybell	Бубенчик гималайский
57	<i>Codonopsis clematidea</i> (Schrenk) Clarke	Asian Bellflower	Кодонопсис ломоносовидный
8	Caprifoliaceae Juss.	Honeysuckle Family	Жимолостные
58	<i>Lonicera hispida</i> Pall. ex Schult.	Hispid Honeysuckle	Жимолость щетинистая
59	<i>Lonicera semenovii</i> Regel	Semenov's Honeysuckle	Жимолость Семенова
9	Caryophyllaceae Juss.	Pink Family	Гвоздичные
60	<i>Cerastium bungeanum</i> Vved.	Bunge Chickweed	Ясколка Бунге
61	<i>Cerastium cerastoides</i> (L.) Britt.	Mountain Chickweed	Ясколка ясколковидная
62	<i>C. lithospermifolium</i> Fisch.	Gronwell-leaf Chickweed	Ясколка воробейникилистная
63	<i>Gastrolychnis apetala</i> (L.). Tolm. et Kozhanczikov	Apetalous Gastrolychnis	Гастролихнис безлепестный
64	<i>Minuartia biflora</i> (L.) Schinz et Thell.	Biflorate Sandwort	Минуарция двухцветковая
65	<i>M. stricta</i> (Sw.) Hiern. (=M. schischkinii Adyl.)	Bog Sandwort	Минуарция прямая
66	<i>M. verna</i> (L.) Hiern.	Vernal Sandwort	Минуарция весенняя
67	<i>Silene graminifolia</i> Otth	Graminifolious Campion	Смолевка злаколистная
68	<i>Stellaria brachypetala</i> Bunge	Short-petaled Chickweed	Звездчатка коротколепестная

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
10	Chenopodiaceae Vent.	Goosefoot Family	Маревые
69	<i>Chenopodium foliosum</i> Aschers.	Strawberry Sticks	Марь олиственная
70	<i>Microgynoecium tibeticum</i> Hook. fil.	Tibetan Goosefoot	Микрогинециум тибетский
71	<i>Suaeda olufsenii</i> Pauls.	Olufsen's Seepweed	Сведа Олуфсена
11	Crassulaceae DC.	Crassula Family	Толстянковые
72	<i>Rhodiola coccinea</i> (Royle) Boriss.	Clustered Rhodiola	Родиола ярко-красная
73	<i>Rh. gelida</i> Schrenk	Icy Rhodiola	Родиола холодная
74	<i>Rhodiola linearifolia</i> Boriss.	Linear Leaves Rhodiola	Родиола линейнолистная
12	Cyperaceae Juss.	Sedge Family	Осоковые
75	<i>Baeothryon pumilum</i> (Vahl) Á. et D.Löve	Dwarf Club-rush	Пухонос приземистый
76	<i>Carex atrofusca</i> Schkuhr V.Krecz.)	Dark-brown Sedge	Осока черно-бурая
77	<i>C. dimorphotheca</i> Stschegl. (=C. <i>stenophylloides</i> V. Krecz)	Heterocarpous Sedge	Осока разноплодная
78	<i>C. melanantha</i> C. A. Mey.	Black-flowered Sedge	Осока черноцветковая
79	<i>C. orbicularis</i> Boott	Orbicular Sedge	Осока округлая
80	<i>C. pseudofetida</i> Kuk.	False Fetid Sedge	Осока ложновонючая
81	<i>C. stenocarpa</i> Turcz. ex V.Krecz.	Stenocarpous Sedge	Осока узкоплодная

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
82	<i>Kobresia capilliformis</i> Ivanova	Hair-like Bog-Sedge	Кобрезия волосовидная
83	<i>Kobresia humilis</i> (Trautv.) Serg.	Low Bog-Sedge	Кобрезия низкая
84	<i>Kobresia stenocarpa</i> (Kar. et Kir.) Steud.	Stenocarpous Bog-Sedge	Кобрезия узкоплодная
13	Dipsacaceae	Scabious Family	Скабиозные
85	<i>Scabiosa alpestris</i> Kar. et Kir.	Alpine Scabious	Скабиоза высокогорная
14	Ephedraceae Dumort.	Ephedra Family	Эфедровые
86	<i>Ephedra regeliana</i> Florin	Regel Ephedra	Эфедра Регеля
15	Fabaceae Lindl.	Pea Family	Бобовые
87	<i>Astragalus abramovii</i> Gontsch.	Abramov's Milk-vetch	Астрагал Абрамова
88	<i>A. alatavicus</i> Kar. et Kir.	Alatavskii Milk-vetch	Астрагал алатавский
89	<i>A. alpinus</i> L.	Alpine Milk-vetch	Астрагал альпийский
90	<i>A. densiflorus</i> Kar. et Kir.	Dense-flowered Milk-vetch	Астрагал густоцветковый
91	<i>A. kuschakewiczii</i> B. Fedtsch.	Kushakevich Milk-vetch	Астрагал Кушакевича
92	<i>A. nivalis</i> Kar. et Kir.	Snow Milk-vetch	Астрагал снежный
93	<i>Caragana jubata</i> (Pall.) Poir.	Jubate Pea Shrub	Карагана гривастая
94	<i>Hedysarum kirghisorum</i> B. Fedtsch.	Kyrgyz Tick Trefoil	Копеечник киргизский
95	<i>O. chionobia</i> Bunge	Chionophobous Locoweed	Остролодочник приснежный

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
96	<i>O. globiflora</i> Bunge	Globe-flower Locoweed	Остролодочник шароцветный
97	<i>O. humifusa</i> Kar. et Kir.	Humifuse Locoweed	Остролодочник стелющийся
98	<i>O. lapponica</i> (Wahlenb.) J. Gay	Lapland Locoweed	Остролодочник лапландский
99	<i>O. melanotricha</i> Bunge	Melanotic Locoweed	Остролодочник черноволосый
100	<i>O. glabra</i> (Lam.) DC.	Glabrate Locoweed	Остролодочник голый
101	<i>O. platysema</i> Schrenk	Flat Vexillum Locoweed	Остролодочник плоскопарусный
102	<i>Thermopsis alpina</i> (Pall.) Ledeb.	Alpine Pea	Термопсис альпийский
103	<i>Vicia semenovii</i> (Regel et Herd.) B. Fedtsch.	Semenov's Vetch	Вика Семенова
16	Fumariaceae DC.	Fumitory Family	Дымянковые
104	<i>Cysticorydalis fedtschenkoana</i> (Regel.) Ikonn.	Fedchenko's Cystic Corydalis	Цистикоридалис Федченко
17	Gentianaceae Juss.	Gentian Family	Горечавковые
105	<i>Comastoma falcatum</i> (Turcz.) Toyokuni	Falcate Comastoma	Комастома серповидная
106	<i>Gentiana algida</i> Pall.	Algid Gentian	Горечавка холодная
107	<i>Gentiana karelinii</i> Griseb.	Karelina Gentian	Горечавка Карелина
108	<i>G. kaufmanniana</i> Regel et Schmalh.	Kaufman's Gentian	Горечавка Кауфманна

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
109	<i>G. kirilowii</i> Turcz. (= <i>G. tianschanica</i> Rupr.)	Kirilov's Gentian	Горечавка Кирилова
110	<i>Gentianella turkestanorum</i> (Gand.) Holub	Turkestani Gentian	Горечавочка туркестанцев
111	<i>Gentianopsis barbata</i> (Froel.) Ma	Barbate Gentian	Гентианопсис бородатый
112	<i>Lomatogonium carinthiacum</i> (Wulf.) Reichenb.	Blue Feltwort	Ломатогониум каринтийский
113	<i>Swertia marginata</i> Schrenk	Marginate Swertia	Сверция окаймленная
18	Geraniaceae Juss.	Geranium Family	Гераниевые
114	<i>Geranium saxatile</i> Kar. et Kir.	Saxatile Geranium	Герань скальная
19	Juncaceae Juss.	Juncus (Rush) Family	Ситниковые
115	<i>Juncus triglumis</i> L.	Three-glume Rush	Ситник трехчешуйный
20	Lamiaceae Lindl.	Mint Family	Яснотковые
116	<i>Dracocephalum heterophyllum</i> Benth.	White Dragonhead	Змееголовник разнолистный
117	<i>D. imberbe</i> Bunge	Beardless Dragonhead	Змееголовник безбородый
	<i>D. discolor</i> Bunge (<i>D. paulsenii</i> Briq.)	Two-color Dragonhead	Змееголовник двуцветный
118	<i>D. stamineum</i> Kar. et Kir.	Staminate Dragonhead	Змееголовник тычиночный
119	<i>Phlomoides oreophila</i> (Kar. et Kir.) Adylov et al. (<i>Phlomis oreophila</i> Kar. et Kir.)	Mountain Phlomoides	Фломоидес горный

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
120	<i>Scutellaria oligodonta</i> Juz.	Oligodontous Scullcap	Шлемник малозубый
21	Liliaceae Juss.	Lily Family	Лилейные
121	<i>Gagea michaelis</i> Golosk.	Michael's Gagea	Гусиный лук Михаила
122	<i>G. pseudoerubescens</i> Pasch.	False Erubescents Gagea	Гусиный лук ложнокраснеющий
123	<i>Lloydia serotina</i> (L.) Reichenb.	Snowdon Alplily	Ллойдия поздняя
124	<i>Tulipa heterophylla</i> (Regel) Baker	Heterophyllous Tulip	Тюльпан разнолистный
22	Papaveraceae Juss.	Poppy Family	Маковые
125	<i>Papaver croceum</i> Ledeb.	Orange Poppy	Мак оранжевый
23	Parnassiaceae S. F. Gray	Grass-of-Parnassus Family	Белозоровые
126	<i>Parnassia laxmannii</i> Pall. ex Schult.	Laxman Grass-of-Parnassus	Белозор Лаксманна
24	Poaceae Barnhart	Bluegrass Family	Мятликовые
127	<i>Agropyron schrenkianum</i> (Fisch. et C.A.Mey.) P.Candargy	Shrenk Wheat Grass	Пырей Шренка
128	<i>Alopecurus pratensis</i> L. (A. songaricus (Schrenk) V.Petrov)	Meadow Foxtail Grass	Лисохвост луговой
129	<i>Anthoxanthium alpinum</i> A. et D. Love	-	Пахучеколосник альпийский
130	<i>Arctopoa tibetica</i> (Munro ex Stapf) Probat.	Poa Tibetica	Арктопоа тибетское

№	Family, species (Latin name)	Family, species (English name)	Семейство, виды (русское название)
131	<i>Calamagrostis anthoxanthoides</i> (Munro) Regel	Odoriferous Reedgrass	Вейник пахучеколосниковый
132	<i>C. dubia</i> Bunge	Ambiguous Reedgrass	Вейник сомнительный
133	<i>Deschampsia caespitosa</i> (L.) Beauv.	Tufted Hairgrass	Луговик дернистый
134	<i>D. koelerioides</i> Regel	Caespitose Hairgrass	Луговик тонконоговидный
135	<i>Elymus tschimganicus</i> (Drob.) Tzvel.	Chimgan Wheatgrass	Колосняк чимганский
136	<i>E. schrenkianus</i> (Fisch. et C. A. Mey.) Tzvel.	Schrenk Wheatgrass	Колосняк Шренка
137	<i>Festuca alata</i> (St.-Yves) Roshev.	Alatavic Fescue Grass	Овсяница алатавская
138	<i>F. valesiaca</i> Gaudin	Volga Fescue Grass	Овсяница валезийская
133	<i>Helictotrichon desertorum</i> (Less.) Nevski	Desert Oat Grass	Овсец пустынный
140	<i>H. hookeri</i> (Scribn.) Henrard (<i>H. asiaticum</i> (Roshev.) Grossh.)	Hooker's Oat Grass	Овсец Гукера
141	<i>H. pubescens</i> (Huds.) Pilg.	Pubescent Oat Grass	Овсец опушенный
142	<i>Hierochloe odorata</i> (L.) Beauv.	Holy Grass	Зубровка душистая
143	<i>Hordeum brevisubulatum</i> (Trin.) Link	Short Subulate Barley	Ячмень короткошиловидный
144	<i>Leymus dasystachys</i> (Trin.) Pilg.	Wild Rye	Леумус пушистоколосый
145	<i>Paracolpodium altaicum</i> (Trin.) Tzvel.	Altaic Paracolpodium	Параколподиум алтайский

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146	<i>Poa alpina</i> L.	Alpine Bluegrass	Мятлик альпийский
147	<i>Poa litvinoviana</i> Ovcz.	Litvinov's Bluegrass	Мятлик Литвинова
148	<i>Ptilagrostis mongolica</i> (Trin.) Griseb.	Mongolian Ptilagrostis	Птилагростис монгольский
149	<i>Stipa subsessiliflora</i> (Rupr.) Roshev.	Stalkless Flowered Feather Grass	Ковыль сидячецветковый
150	<i>Trisetum spicatum</i> (L.) K. Richt.	Spike Trisetum	Трищетинник колосистый
25	Polygonaceae Juss.	Buckwheat Family	Гречишные
151	<i>Aconogonon songaricum</i> (Schrenk) Hara (= <i>Polygonum songaricum</i> Schrenk)	Djungaria Knotweed	Аконогон джунгарский
152	<i>Bistorta vivipara</i> (L.) S. F. Gray	Alpine Bistort	Бисторта живородящая
153	<i>Oxyria didyna</i> (L.) Hill	Mountain Sorrel	Кисличник двустолбиковый
154	<i>Polygonum cognatum</i> Meissn.	Cognate Knotweed	Горец родственный
155	<i>Rheum spiciforme</i> Royle	Spiked Rhubarb	Ревень колосовидный
156	<i>Rheum wittrockii</i> Lundstr.	Wittrock's Rhubarb	Ревень Виттрока
26	Potamogetonaceae Dumort.	Pondweed Family	Рдестовые
157	<i>Potamogeton pectinatus</i> L.	Fennel-leaved Pondweed	Рдест гребенчатый
27	Primulaceae Vent.	Primrose Family	Первоцветные
158	<i>Androsace dasyphylla</i> Bunge	Rock Jasmin	Проломник волосистolistный

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159	<i>A. lehmanniana</i> Spreng.	Lehmann's Rock Jasmin	Проломник Леманна
160	<i>A. septentrionalis</i> L. s. l.	Pygmy-Flower Rock-Jasmine	Проломник северный
161	<i>Cortusa brotheri</i> Lipsky	Himalayan Bell Primrose	Кортуза Бротеруса
162	<i>Primula algida</i> Adams	Algid Primrose	Примула холодная
163	<i>P. pamirica</i> Fed.	Pamir Primrose	Примула памирская
164	<i>P. turkestanica</i> (Haage et Schmidt) E. A. White	Turkestani Primrose	Примула туркестанская
28	Ranunculaceae Juss.	Buttercup Family	Лютиковые
165	<i>Aconitum rotundifolium</i> Kar. et Kir.	Roundleaf Monkshood	Аконит круглолистный
166	<i>Batrachium trichophyllum</i> (Claix) Bosch (= <i>B. divaricatum</i> (Schränk) Wimm.)	Water Threadleaf Crowfoot	Водяной лютик волосистостлистный
167	<i>Callianthemum alatavicum</i> Freyn	Alatavic Beautiful Flower	Красивоцветник алатавский
168	<i>Halerpestes sarmentosa</i> (Adams) Kom.	Sarmentose Buttercup	Ползунок отпрысковый
169	<i>Oxygraphis glacialis</i> (Fisch.) Bunge	Glacier Oxygraphis	Оксиграфис ледниковый
170	<i>Pulsatilla campanella</i> Fisch. ex Regel et Til.	Pasque Flower	Прострел колокольчиковый
171	<i>Ranunculus alberti</i> Regel et Schmalh.	Albert's Buttercup	Лютик Альберта
172	<i>R. brotherusii</i> Freyn	Broterus Buttercup	Лютик Бротеруса

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173	<i>R. karelinii</i> Czer. (= <i>R. gelidus</i> Kar. et Kir., non Hoffmegg)	Karelina Buttercup	Лютик Карелина
174	<i>R. natans</i> C. A. Mey.	Natant Buttercup	Лютик плавающий
175	<i>R. pedatifidus</i> Sm.	Northern Buttercup	Лютик лапчатораздельный
176	<i>R. popovii</i> Ovcz.	Popov's Buttercup	Лютик Попова
177	<i>R. pulchellus</i> C. A. Mey.	Long-Stem Buttercup	Лютик изящный
178	<i>R. transiliensis</i> M. Pop. ex Gamajun	Zailyiskiy Buttercup	Лютик заилийский
179	<i>Thalictrum alpinum</i> L.	Alpine Meadow Rue	Василистник альпийский
180	<i>Trollius lilacinus</i> Bunge	Lilac Globeflower	Купальница лиловая
29	Rosaceae Juss.	Rose Family	Розовые
181	<i>Pentaphylloides phyllocalyx</i> (Juss.) Sojak	-	Пентафиллоидес листочашечный
182	<i>Potentilla gelida</i> C. A. Mey.	Gelid Cinquefoil	Лапчатка холодная
183	<i>P. moorcroftii</i> Wall. ex Lehm.	Feather-leaved Cinquefoil	Лапчатка Муркрофта
184	<i>P. multifida</i> L.	Cut-leaved Cinquefoil	Лапчатка многограссеченная
185	<i>P. nervosa</i> Juss.	Nervate Cinquefoil	Лапчатка жилковая
186	<i>P. nivea</i> L.	Snowy Cinquefoil	Лапчатка снежная
187	<i>P. soongarica</i> Bunge	Djungaria Cinquefoil	Лапчатка джунгарская

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188	<i>Sibbaldia tetrandra</i> Bunge	Four-Stamen Sibbaldia	Сиббальдия четырехтычиночная
30	<i>Saxifragaceae</i> Juss.	Saxifrage Family	Камнеломковые
189	<i>Chrysosplenium nudicaule</i> Bunge	Bare-stalked Saxifrage	Селезеночник голостебельный
190	<i>Saxifraga hirculus</i> L.	Yellow marsh Saxifrage	Камнеломка болотная
191	<i>S. oppositifolia</i> L.	Mountain Saxifrage	Камнеломка супротивнолистная
192	<i>S. sibirica</i> L.	Siberian Saxifrage	Камнеломка сибирская
31	<i>Scrophulariaceae</i> Juss.	Figwort Family	Норичниковые
193	<i>Euphrasia pectinata</i> Ten.	Pectinate Eyebright	Очанка гребенчатая
194	<i>Lagotis decumbens</i> Rupr.	Decumbent Lagotis	Лаготис лежащий
195	<i>Pedicularis cheilanthisfolia</i> Schrenk	White Lousewort	Мытник краекучниколистный
196	<i>P. dolichorhiza</i> Schrenk	Long-root Lousewort	Мытник длиннокорневой
197	<i>P. oederi</i> Vahl.	Oeder's Lousewort	Мытник Эдера
198	<i>P. rhinanthoides</i> Schrenk	Rattle Lousewort	Мытник погремковый
199	<i>Veronica ciliata</i> Fisch.	Ciliate Speedwell	Вероника реснитчатая
200	<i>Veronica polita</i> Fries	Grey Field-Speedwell	Вероника скромная
32	<i>Umbelliferae</i> Juss.	Umbrella Family	Зонтичные
201	<i>Angelica brevicaulis</i> (Rupr.) B. Fedtsch.	Short-stalked Angelica	Дудник короткостебельный

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202	<i>Lomatocarpa albomarginata</i> (Schrenk) M. Pimen et Lavrova	White Lomatocarpa	Ломатокарпа белоокаймленная
203	<i>Schulzia albiflora</i> (Kar. et Kir.) M. Pop.	White Schulzia	Шульция белоцветковая
33	<i>Violaceae</i> Batsch	Violet Family	Фиалковые
204	<i>Viola altaica</i> Ker-Gawl.	Alpine Violet	Фиалка алтайская
205	<i>V. tianschanica</i> Maxim.	Tien-Shan Violet	Фиалка тяньшанская

During investigation of Kumtor Mine Site area we found 205 plant species belonging to 33 families.

Wood plants species are almost not found.

Appendix 6: 2008 Management Plan for the SCER still awaiting KR Government approval