1. Summary 2
2. History of the Caspian tiger 5
3. Potential tiger restoration in the Caspian tiger’s historic range 10
4. Ecosystem preparation of the Ili River-Lake Balkhash ecosystem 13
   4.1. Hydrology and water resource management 13
   4.2. Current resource use and required adjustments 15
   4.3. Existing Protected Areas and their development potential 20
   4.4. Conservation system and land and resource monitoring 23
   4.5. Status of ungulate populations and measures for their restoration and growth 24
      Wild boar 24
      Bukhara deer 25
      Other species 26
5. Tiger reintroduction in the Ili River-Lake Balkhash basin 28
   5.1. Sourcing animals for reintroduction and formation of the tiger population 28
      Schematic programme realization timetable 32
   5.2. Site selection and outfitting for adaptation process and release 34
   5.3. Technical and legal requirements for reintroduction 34
6. Monitoring programme success 36
   6.1. Monitoring ecosystem conditions and tiger and ungulate population dynamics 36
   6.2. Organizing and conducting scientific research 37
7. Organizational and financial support 38
   Programme partners 39
   Programme financial support 40
Abbreviations 41
List of appendices 42
Literature 43
Summary

At the start of the 20th century, approximately 100,000 tigers belonging to nine subspecies roamed the earth. By the turn of the next century, only 3,500 tigers remained and four subspecies were extinct. Two of these – Javan and Bali tigers – lived on islands in Indonesia. The South China subspecies is also considered extinct in the wild, although it is possible that isolated individuals exist. The fourth extinct subspecies – the Caspian tiger, or, as it is known in Russian, the Turanian (Panthera tigris virgata Illiger, 1815) – once populated 13 nations in the Middle East, the Caucasus, and Central Asia, stretching from Turkey to northwestern China. Considering that by the start of the 21st century only thirteen countries still had tiger populations, the extinction of this subspecies reduced the number of countries supporting tiger populations almost by half.

The catastrophic decline in global tiger population led Robert Zoellick, president of the World Bank, to launch the Global Tiger Initiative in 2008. Thanks to this initiative, the International Forum on Tiger Conservation took place in 2010 at the head of state level in St. Petersburg and at the invitation of then Russian Prime Minister Vladimir Putin. During the forum, the Global Tiger Recovery Programme was endorsed, setting a goal of doubling the number of tigers in the wild by 2022. It was at this forum that WWF Russia and WWF Kazakhstan proposed efforts to restore the tiger population in Central Asia.

At the beginning of the 20th century, the Caspian tiger population was greater than that of all tiger populations remaining globally at the start of the 21st century. The last individuals in this subspecies had vanished in the wild and from human recollection by the 1970s.

It is important to note that unlike most other subspecies, the range of the Caspian tiger was always linear and patchy. Tigers were constrained to river valleys and lakeshores, separated by vast uninhabited steppes and deserts.

The main factors leading to the disappearance of the Caspian tiger were targeted extermination, including by military troops, uncontrolled hunting for ungulates (the tiger’s prey base), and later, habitat destruction caused by numerous irrigation projects. These projects resulted in widespread drought and the disappearance of tugai forests1 and reed thicket ecosystems, earlier found alongside all major rivers and lakes.

If by the end of the 1990s the situation had only worsened (recall the shrinking of the Aral Sea due to overuse of water for agriculture), then the breakup of the Soviet Union and the transition of almost all the newly formed countries to market economies considerably changed the situation. Many countries saw a significant reduction in agricultural lands previously irrigated with river water, and by the beginning of the 21st century, there were clear signs that lost ecosystems were beginning to regenerate. The idea of restoring the tiger in this area arose as a result.

Despite the broad historical distribution of the Caspian tiger, there is no specialized research available on its biology, ecology, and behaviour. The most complete information was collected by A. A. Sludsky (1972), a researcher from Kazakhstan, who determined four key factors for the successful existence of tigers in Central Asia:

- Availability of significant areas suitable for tiger habitat;
- Abundant fresh water resources;
- High population densities of wild boar and Bukhara deer, preferably other ungulates as well, including, for example, roe deer; and
- Limited snow cover.

1 Tugai – a unique valley and coastal ecosystem comprised of trees and shrubs, tall grasses, and patches of impassable jungle with intertwined trees, shrubs, vines, open water/wetlands, and masses of tall reeds and grasses several metres in height.
Additionally, a legal ban on tiger hunting must be enacted along with effective enforcement of the ban.

These conditions were used to identify potentially suitable sites for restoration of the tiger population. A group of experts from Kazakhstan, Russia, and Switzerland analysed potential sites in the framework of the WWF project (Jungius, 2011).

Unfortunately, the majority of countries in the tiger’s former range do not meet the first criterion. Azerbaijan, Armenia, Georgia, Iran, Kyrgyzstan, China (Caspian tigers lived in Xinjiang-Uyghur Autonomous Region), Tajikistan, Turkmenistan, and Turkey do not have uninhabited areas that are sufficiently large to sustain a viable tiger population. Afghanistan and Iraq were not included in the study due to complicated domestic political situations that render such a programme impossible.

Based on existing and potential habitat restoration areas, the study identified two potential regions for tiger reintroduction in the former Caspian tiger range. The choices were based on both current status and potential for change in these territories. The first region is the Aral Sea in Uzbekistan, where tugai forests are taking over the exposed seafloor. However, it will take a minimum of 10-15 years (more likely 25-30) before that ecosystem develops to the point that it can sustain high densities of ungulates.

The second region outlined as a potential site for the restoration programme is the southern shore of Lake Balkhash in Kazakhstan, around and to the east of the Ili River delta. Wild boar are found here in vast tugai woodlands and reed thickets, and Bukhara deer could be reintroduced. The potential tiger habitat spans over 1 million hectares. Circumstantial historical evidence collected from hunting records and frequencies of encounters show that the Caspian tiger population density in Central Asia was much higher than that of the Amur tiger and was similar to tiger densities in India. This permits us to estimate the possibility of establishing a tiger population in the Balkhash region of at least 100 animals (maximum 200). This is considerably larger than most surviving tiger populations. Therefore, restoration of the tiger population in the Balkhash region would make a considerable contribution to the Global Tiger Recovery Programme.

The tiger restoration programme in Balkhash will take at least 15 years and will include the following key stages:

1. Habitat preparation
2. Releasing tigers into the wild
3. Monitoring programme success

During site preparation, new Protected Areas must be created with strict enforcement over at least half of the proposed future habitat. It is also critical to ensure that economic use of the areas aligns with programme goals. A comprehensive management plan for the area must be developed and implemented, including a plan to stop poaching and prevent banned natural resource use activities. It is simultaneously necessary to increase the population density of wild boar by an order of magnitude through intentional breeding, potentially accomplished by engaging existing leaseholders of hunting territories. Considering that the successful existence of tigers across the entire range from India to the Amur is ensured by a minimum of 2 large prey species – the wild boar and large deer – it is necessary to restore the Bukhara deer population (currently absent in the area) over a relatively short period. This would require bringing in 40-50 deer annually over a 4-5 year period. Moreover, where possible, it is planned to increase populations of roe deer, goitered gazelle, and saiga antelope, as well as to restore the Asiatic wild ass (kulan) in adjacent steppe and semi-desert ecosystems, although these species have always been exotic prey for tigers. Past experience in hunting areas adjacent to the future reintroduction area indicate that the total density of wild boar and Bukhara deer could reach 60-80 animals per 1,000 hectares. This stage will take an estimated 5
years, and upon its conclusion, it is anticipated that the ecosystem will be capable of sustaining a viable tiger population.

Once the area is ready, tigers will be brought in for release. Cytogenetic studies (Driscoll et al., 2009) show close linkage, if not equivalence, between the Caspian and Amur tiger subspecies. Thus, Amur subspecies tigers will be released in the Balkhash area. There are two possible sources for animals: zoos, which have numerous breeding pairs, or from the wild in the southern Russian Far East. The final decision on source animals will be taken at a later stage and will depend on experiences releasing captive-bred cubs or rehabilitated orphaned animals in other reintroduction programmes. Experiments are now underway in the Russian Far East, and others are in the works in southern China. In the event that these release experiments are successful, then captive animals will be used following the required preparation. If those experiments are unsuccessful, then it may be possible to capture 2-3 animals each year in the Far East without damage to the local population, where approximately 100 cubs are born each year. This stage will conclude in 5-7 years, after the release of at least 20 tigers.

During the final stage, we plan to establish a detailed ecosystem monitoring system to allow for a rapid response to any problems that may arise, either in the hydrologic regime, which is basis for the existence of tugai forests and reed thickets, or with the ungulate populations. Particular attention will be directed to the success ratio for tiger reproduction and tiger population dynamics. This stage will last for at least 5 years following the release of the last tigers although it is anticipated that research in the region will continue even after the programme’s conclusion.

Special attention will also be afforded to the Ili River’s hydrologic regime at all stages of the programme’s realization, particularly to water withdrawals in China and Kazakhstan. The Balkhash tiger restoration programme provides an important impetus for an agreement between Kazakhstan and China to regulate water use policy in the Ili River basin.

Long-term plans include significant changes to the region’s environment and land-use activities, all aimed at restoration of disturbed areas of the ecosystem. The success of the tiger as a top-level flagship species will become a health indicator for ecosystem restoration and a symbol of unprecedented conservation success for the Republic of Kazakhstan.

The actions outlined in the Programme above are in full accordance with a state Programme to transition the Republic of Kazakhstan to a green economy, approved by presidential decree on 30 May 2013 (№ 577). Specifically, the programme will contribute directly by completing section 3.7 “Conservation and sustainable ecosystem management”.
History of the Caspian Tiger

The Caspian or the Turanian tiger, as it is known in Russian, (*Panthera tigris virgata*, Illiger, 1815) was one of 9 tiger subspecies and, at the end of the 19th century, it inhabited Azerbaijan, Armenia, Afghanistan, Georgia, Iraq, Iran, Kazakhstan, Kyrgyzstan, China (Xinjiang-Uyghur Autonomous Region), Tajikistan, Turkmenistan, Turkey, and Uzbekistan (Figure 1). Earlier, in the 10th-12th centuries, there are historical accounts of tiger encounters in the south Russian steppe and forest-steppe in what is now modern Ukraine. In the mid-19th century, tigers were regularly seen north of the Glavny Kavkazsky Ridge in reed thickets along the Kuban and Terek river valleys, in the Don River delta, and along the shores of the Azov Sea. In Altai, the Caspian tiger crossed over from neighbouring Kazakhstan, and there are eyewitness accounts of encounters in the 19th and even 20th centuries near Barnaul and Biysk.

Unlike most of the other subspecies whose ranges were fragmented by human activity, the distribution of the Caspian tiger has always been a linear patchwork. This is related to the Caspian tiger’s preference for tugai forests and reed thickets along river valleys, lakes, and oxbow lakes. Despite some limited use of adjacent mountain and semi-desert areas with sufficient prey base, there were large uninhabited areas of steppe and desert interspersed with suitable tiger habitat, separated by hundreds of kilometres. There is evidence that there was contact between these isolated groups, probably due to the dispersal of young animals. Tigers are known to have crossed over the Syrdarya River lowlands to the Amudarya delta and in reverse. They are also known to have crossed over the Bolshoy Balkhan ridge in western Turkmenistan. Obviously, a corridor existed for a long period connecting Kopetdag in Turkmenistan with the Caucasus region (Azerbaijan, Armenia, and Turkey) by way of the Iranian province of Mazendaran.

Figure 1. Historic Caspian tiger range and documented encounters with specific animals. Areas 1 and 2 are potentially suitable for restoration of the tiger’s range.
The tiger had disappeared in Iraq by the end of the 19th century; the last tiger killing was documented in 1887 (Kock, 1990). In the early 20th century in Iran, tigers were still a common occurrence in the country’s northern provinces, and hundreds of animals still lived there in the 1930s. The most stable populations lived on the southern shores of the Caspian Sea, along the Iran-Turkmenistan border. In the 1960s, tigers were found along the southwestern part of the Caspian Sea, where the last time a tiger was killed was in 1957, although it is possible that a few of the predators remained in the area until the 1970s. The last tiger was shot in southeastern Turkey in 1970. The last tiger was killed in Georgia in 1936, not far from Tbilisi, while the last one was killed in Armenia in 1948. The last Caspian tigers in Azerbaijan were recorded near the Caspian Sea in 1964.

In the 19th century, the tiger was commonplace in northwestern China. It had disappeared across most of its range by the 1920s and was extirpated by the end of the 1950s. The tiger was also broadly distributed in eastern China, inhabiting reed thickets and oases containing rich populations of wild boar. By 1920, the tiger was extirpated there as well.

The tiger was commonly found in tugai forests on the left bank of the Panj River in Afghanistan along the Tajik border. It remained there until the late 1940s-early 1950s, and the last instances of the tiger in this region were recorded in 1964 and 1971 in the Vakhsh River valley.

Tigers were common in the Amudarya River lowlands in Uzbekistan in the early 20th century, but by 1930, the animal’s population had dropped dramatically. There were 12-15 tigers recorded in the Amudarya delta in the 1940s. The last known tiger killing took place in 1947, but single animals were observed in 1955, 1963, 1966, and 1968.

The last tiger in Kazakhstan’s Syrdarya River lowlands was killed in 1933, although individual animals were documented in 1937 and 1945, crossing over from the Amudarya River basin. It is thought that the last tiger in the Syrdarya River lowlands was recorded in the early 1950s.

The tiger was systematically eradicated in the Ili River valley and along the southern shores of Lake Balkhash in Kazakhstan at the turn of the 20th century. Shootings were organized with the assistance of soldiers and extermination brigades beginning in 1891. Animals sometimes died due to fire when reed thickets were set afire. There were still documented tiger encounters through 1947. Beginning in 1948, hundreds of hunters surveyed unanimously agreed that there was no more evidence of tiger activity.

In the mid-1960s, the Caspian tiger was listed in the IUCN Red Book as a Category 1 species “Extinct”.

The main reasons for the extinction of the Caspian tiger are habitat destruction and persecution (Figure 2). Significant decreases in ungulate populations – the tiger’s main prey base – also played a significant role.

Figure 2. Destruction of the tiger in Central Asia in the 19th-20th centuries.
Prior to the arrival of Europeans, local residents did not perceive the tiger as a threat to human life, or, at least, they were reconciled to living as neighbours. Tigers were only a small threat to herders, as livestock was pastured mainly outside of the tiger’s habitat. Targeted destruction of the tiger began with the appearance of the Russian army, which organized extermination brigades to “cleanse” the region of tigers beginning in 1891.

In the first half of the 20th century tigers were poisoned with strychnine and caught using steel leg-hold traps. Hunters were able to sell the beautiful pelts for profit as well as collect significant prizes for destroying the predators.

The transformation of river bottomlands played no less of a role than that of direct extermination. By the 1930s, tugai forests in the Amudarya and Syrdarya deltas had been cleared and burned, and reed thickets converted for agricultural use. The tiger’s main prey base, wild boar and Bukhara deer, disappeared along with tugai forests. The same process occurred in many other lowland areas along other large rivers with patches of Caspian tiger habitat – the Murgab, Panj, and Ili Rivers.

Agricultural development and the destruction of natural habitat in the Ili River lowlands along the southern shores of Lake Balkhash played less of a role than it did in the Amudarya Basin. The main factors that led to the ultimate extirpation of tigers were extermination, disruptions to the prey base (unregulated hunting of ungulates), and the loss of reed thickets and tugai from spring fires that annually destroyed all vegetation over great portions of the delta, occasionally multiple times in one season. It is also worth noting that the tiger disappeared in the Ili River-Lake Balkhash region even earlier than in other parts of the range, including the Amudarya watershed. Specialists believe that this could be related to the activities of professional hunters targeting muskrats based in the Ili delta in the 1940s.

A complete ban on tiger hunting by the Soviet Union in 1947 unfortunately came too late to save the Caspian tiger, although the ban did allow for the Amur tiger’s preservation and even a significant population increase.

The Caspian tiger population was never analysed within the borders of its historic range; there are no data on population density in the main parts of its range, and there is very little known about the size of individual territories. Indirect information is the only source for rather approximate evaluations of the population’s spatial structure and relative abundance.

Notably, before World War I up to 50 Caspian tigers were killed every year in the Amudarya (Uzbekistan), Panj, and Vakhsh (Tajikistan) basins (Sludsky, 1953). Today, no more than 40,000-50,000 hectares of tugai forest remain in the Amudarya basin, and experts calculate that this represents no more than 10% of the area of original tugai ecosystem. Thus, by the start of the 20th century, one tiger was killed per 10,000 hectares each year, and the population sustained this pressure over the course of several decades. For comparison, one tiger per 10,000 hectares is the maximum documented contemporary tiger population density in the southern Russian Far East. Obviously, tiger density in Central Asia was exponentially higher.
The story of Tigrovaya Balka Nature Reserve in Tajikistan is another example of the Caspian tiger’s high population density. The reserve was created in 1938 with the specific goal of preserving the Caspian tiger. With a total area of 49,000 hectares, tugai forests occupied about half that area. By the 1940s, the tiger population consisted of 12-15 animals (Chernyshev, 1958). It follows that a tiger population density of 2-3 cats per 10,000 hectares was already a “remnant” population for this type of ecosystem.

Data regarding individual home ranges of the Caspian tigers are very limited and are related to a period of population decline ended by the subspecies’ extinction. Caspian tiger home ranges in the Ili delta in the 1930s covered an area of 1,000 km² - already during the period of a low population density, not only of tigers, but also of wild ungulates (Sludsky, 1972). In Tajikistan, tiger home ranges in the Tigrovaya Balka Reserve varied between 35-50 km² in the 1930s and 1940s (Flerov, 1935; Stroganov, 1961).

Caspian tiger population density probably had more in common with the density of Indian tiger populations than it did with those in the Russian Far East. In India, tiger density was 7-9 animals per 10,000 hectares (Gopalasvami, 2012), while in Kaziranga National Park, the density reached 32 tigers per 10,000 hectares. http://www.deccanherald.com/content/66643/kaziranga-highest-density-tiger.html

In Central Asia, tiger density should have been even lower, approximately 4-5 animals per 10,000 hectares, due to annual snow cover no matter how brief.

According to A. A. Sludsky (1972), Caspian tiger habitat in Central Asia had to meet the following requirements:
1) Abundant wild boar and Bukhara deer, and in some places, roe deer;
2) Sufficient water;
3) Dense and impassable vegetation used by the tiger as a lair or resting place; and
4) Limited snow cover.

The climate in the Caspian tiger’s historical range varied from subtropical (humid in Azerbaijan, dry in Iraq and Turkmenistan) to severe continental climate in Kazakhstan and China. The annual air temperature range for this species is unparalleled – in the summer maximum temperatures reach 45˚C with lows in the winter of -45˚C.

There are no precise data on Caspian tiger reproduction or their distinguishing characteristics, but various sources suggest that females generally gave birth to 2 cubs, rarely only 1. Tigers reached sexual maturity at 3-4 years for females and 4-5 years of age for males. In observations of captive animals, tigers were still capable of reproducing up to the age of 20 and could live up to 25 years in captivity. In the wild, it is unlikely that tigers lived more than 20-25 years and more often only reached 15-17 years of age. These indicators are useful for planning the reintroduction process and modelling population development.

The tiger’s main prey in Central Asia and Kazakhstan consisted of wild boar, although tigers often hunted roe deer, Bukhara deer, and Siberian wapiti as well as smaller species, right down to pheasants. In the 19th century in the Syrdarya River valley and along the shores of the Aral Sea, tigers hunted wild boar, saiga antelope, goitered gazelle, Przewalski’s wild horse, Asiatic wild ass, and mountain sheep. Wild boar is at the top of the list in terms of preferred prey. Tigers opportunistically hunted jackals and jungle cats and often fed upon rodents, birds, turtles, frogs, and insects. Caspian tigers enthusiastically hunted muskrats in riparian thickets, digging them out of their tunnels. Locusts were a periodic dietary bonus (during swarming), as were the fruits of oleaster and sea buckthorn (Meyendorf, 1826; Eversmann, 1850; Geptner, Sludsky, 1972).

As the largest predator mammal in Central Asian ecosystems, the tiger had essentially no natural enemies. An adult tiger might die from injuries received from an unsuccessful attack on prey, for example a large male wild boar.
There have been no studies of Caspian tiger disease in the wild. In captivity, the tigers suffered from all infectious diseases to which cats are susceptible, as well as other carnivore species. Contamination was also possible when eating the flesh of an infected ungulate. Tigers may also suffer from parasitic infections, ticks, and mites. In recent years, there have been documented cases of tigers infected with distemper, originally considered mainly a canine pathogen. This disease has been documented in Sumatran tigers.
3. Potential tiger restoration in the Caspian tiger's historic range

WWF Russia began the search for an area within the Caspian tiger’s historic range that could be suitable for returning the animal to the wild. In addition to it meeting the characteristics laid out by A. A. Sludsky, the area should be considered suitable for tiger restoration measures over a sufficiently large area of potentially suitable habitat, have a low human population, and be readily protected through conservation measures.

Accordingly, areas within the historic Caspian tiger range including those less frequented were studied for suitability as tiger habitat:

- Areas with existing or potentially restorable tiger habitat with good water resources;
- Areas with current populations of ungulates or conditions suitable to restore ungulate populations;
- Areas with low human population density and low anthropogenic pressures; and
- Areas with considerable protection including a significant portion of existing or planned protected areas.

Unfortunately, most countries within the original range did not contain areas suitable for reintroduction of the species. There are no undeveloped or uninhabited landscapes of sufficient size to support a viable tiger population in Azerbaijan, Armenia, Georgia, Iran, Kyrgyzstan, China, Tajikistan, Turkmenistan, or Turkey. There are small areas of potentially suitable land in various areas of the historic range, but they are interspersed with territories of intensive human activity. Afghanistan and Iraq were not studied because the complex internal political situations in both countries do not lend themselves to such programmes.

An initial analysis of lands in Central Asia was conducted using materials from the GEF/UNEP/WWF project “Econet Central Asia”. Under that project’s framework, a database was created that includes information on the size of various ecosystems, anthropogenic load, etc.

Two areas were proposed for potential reintroduction sites (Figure 1):

1. The Amudarya River delta and adjoining newly forming ecosystems along the southern Aral Sea on the former seafloor.
2. The Ili River delta and the southern shore of Lake Balkhash.

With WWF Russia support, an expert group studied these potential sites from 2005-2009 (Jungius et al., 2009; Jungius, 2011; Bragin, 2010; Lukarevsky, Baidavletov, 2010). When comparing conditions in these two study areas, it was found that both areas are of significant size and contain potentially suitable habitat. Effective reintroduction is possible in the event that measures are taken to restore all aspects of the ecosystems.

The Amudarya delta and adjoining areas on the Aral’s former seafloor are unique and uninhabited by humans with tremendous potential for restoration of wetlands, forest, steppe, and desert ecosystems that could be home to many animal species. However, an analysis of the ecosystems’ current condition, legal protection, and ungulate populations revealed that creating positive ecological conditions in this area require not only significant financial resources but also time. In the best-case scenario, preparing the area for tiger reintroduction would take at least 10-15 years, and accounting for complex administrative procedures and the lack of political motivation could draw it out to 25-30 years. Nonetheless, this ecosystem could become sustainable habitat for a tiger population in the future if the following conditions were met:

- Establish a highly protected area (PA) on 500,000 hectares including the Akpetki Archipelago (Karabayli) and Lake Zholdyrbas (former Aral Sea bay) and semi-desert and desert areas in the former Amudarya delta;
Protected Area should be effectively managed and protected by motivated, highly-qualified, and competent staff;

Sufficient and regular freshwater resources must be made available in the ecosystem;

Livestock agriculture and crop farming should be banned within the PA;

Plans to explore for and extract subsoil resources in the area are developed and implemented following environmental guidelines and priorities; and

Programme to restore ungulate species (wild boar, Bukhara deer, goitered gazelle, and saiga antelope) must be implemented.

The possibility of tiger restoration in this area should be studied again in 2020-2022.

The most promising conditions for Caspian tiger restoration can currently be found in the Ili River delta and on the south shores of Lake Balkhash. Here there are significant natural tiger habitats, although they are partially settled by humans and used for grazing livestock.

The western portion of Lake Balkhash (58% of its surface area) is a shallow freshwater ecosystem. The eastern side of the lake is saline (3.5-6 g/l) and deep.

The southern shores of the lake are low (1-2 m) and sandy. They are flooded regularly during periods of high water, and there are many small lakes separated by reed beds and small hills (5-10 m in height) covered with halophytic vegetation. Trees and bushes are rare. There are approximately 120,000 hectares of this habitat between the deltas of the Ili and Karatal Rivers. The shoreline along Lake Balkhash is sinuous and intersected by numerous bays and coves that are difficult to reach from land. High water levels in the lake result in frequent flooding and expansion of the reed beds.

The Ili Rivers flows into Lake Balkhash at its western end and forms a delta of over 80,000 hectares. Downstream of the village of Bakanas, the delta has the shape of a circular arc stretching for approximately 200 km along the southern shores of Lake Balkhash from its southern tip to the Saryesik Peninsula (Dostaj, 2006).

Deserts surround the Ili delta – the Taukum to the southwest and Sary-Esik-Atyrau to the northeast. In wet years, the delta floods into the desert, which facilitates the creation of more reed beds, islands of thick tugai-like vegetation, and, further from the water, saxaul groves. Small lakes and wetlands with high moisture levels are distributed among sandy areas with dunes and ridges. This transition zone between the delta and the desert varies from year to year depending on annual flood levels.

The surface area and distribution of the various ecosystem types change often depending on total moisture levels and flooding. Tugai vegetation can be found along three channels at the mouth of the Ili as well as along the river’s middle channel. Tree vegetation gradually disappears as the soil grows moister closer to the lake. Close to where the mouth of the delta meets the lake, wetlands and reed beds dominate, interspersed with sand bars and dunes.

It is worth noting that a significant portion of the delta, particularly the former eastern side, remains dry. Wetland ecosystems in the delta and the floodplain have diminished by 40% since 1984, virtually turning into semi-desert. Conservative estimates state that 30% of tugai and reed bed ecosystems remain, which together with transitional habitats, comprise no more than 40% of the delta’s surface area, or approximately 320,000 hectares. At the same time, our own surveying shows that the Ili delta has at least 500,000 hectares of ecosystem suitable for tiger habitat restoration, although a portion of these lands are a mosaic of habitats.

In addition to the Ili delta, there is another patchwork of suitable tiger habitat along the entire southern shore of Lake Balkhash, including the eastern Karatal River delta along with the Aksu and Lepsy River deltas. The total area of potentially suitable ecosystems for tiger reintroduction occupies over 1,000,000 hectares. The majority of these lands have been nominated as internationally significant wetlands (Ramsar Convention), and there are plans to create a nature reserve on at least 500,000 hectares (Figure 3).
**Figure 3.** Distribution of main habitats suitable for tiger reintroduction in the Ili Delta-Southern Balkhash region.

1-4 – “WWF areas”, the initial areas planned for reintroduction; BSh, I-Z, IB, A-L - “Terra sites”, proposed clusters of the nature reserve. There is a description in section 4.3, “Existing protected areas and their development”.
4. Ecosystem Preparation in the Ili-Balkhash basin

4.1. Hydrology and water resource management.

One of the primary threats to this programme’s realization is potential violations of Lake Balkhash’s hydrological regime due to decreases in water volume entering from the Ili River. In order to ensure adequate water supplies, the Republic of Kazakhstan and the People’s Republic of China should achieve an agreement to follow environmentally justified water apportionments in transboundary river basins, first and foremost of which is the Ili River. Government agencies of the Republic of Kazakhstan have already undertaken significant efforts to address this issue.

Pollution from mining activities and extensive use of water for irrigation intended for the lake have both had a negative impact on the Lake Balkhash ecosystem. Unfortunately, it is not possible to eliminate the scenario that this problem will worsen and that the Aral Sea tragedy may be repeated.

With its source in China, the Ili River provides 80% (15 km³) of Lake Balkhash’s water. The river is 1,439 km in length, of which 815 km are located in Kazakhstan. Approximately 70% of the Ili’s water is generated in Central Tien-Shan range in China.

Intensive drying and loss of surface area in the delta in the 1970s and 1980s was caused by water flow regulation in the Ili after construction of the Kapchagai hydroelectric dam and Akdalinsky irrigation program. These projects led to the destruction of the natural hydrological regime, channel formation processes, and displacement of the delta’s main flowoff (Dostaj, 2006). Termination of natural spring-summer floods, a 30% reduction in water flow at the head of the delta, and water level reductions of 1-2 m led to the desiccation of many flow-through and semiflow-through lakes, and a reduction in the surface area of reed thickets, soil salinification, and the desertification of lakeshores and tributaries. In order to reduce these negative influences, the Republic of Kazakhstan decided to lower the upper level of the reservoir by 10 m and to limit reservoir filling plans to 14 km³ instead of the originally planned 28.1 km³. Reductions were also taken in the surface area of irrigated lands. The sharp increase in water levels in that took place in 2005-2010 in Lake Balkhash led to increased water abundance in the delta and changes to the main system of waterways.

However, the situation remains unstable due to growing water diversions from Ili River tributaries on the Chinese side of the catchment basin. The Ili’s main tributary rivers are losing significant water resources to irrigation and hydroelectric power generation within China, where 22 reservoirs have been constructed. As a result, flow in the lower Ili River is relatively unstable, with dried out branches, islands, and sand bars.

The growing use of water for agriculture (3.6 million m³) is the primary disturbance, particularly when combined with primitive irrigation techniques that result in the loss of at least 1 million m³ of freshwater. At the same time, China proposes redirecting water out of the Ili River basin, building a canal to transport water to Lake Ebinoor, and is considering transporting water to the Tarim River in southern Xinjiang-Uyghur Autonomous Region. Implementation of those plans will lead to catastrophic declines in the Ili River and Lake Balkhash. As a first step to optimizing water use, the draft Plan recommends the use of optimized water conservation technologies in Kazakhstan, including drip irrigation, already in use in China. This will reduce water losses by 1 million m³.

An analysis prepared by the Regional Environmental Centre for Central Asia (CAREC) showed that decreased moisture levels and increased water use could lead to the lake being divided into three separate sections. Annual water diversions of approximately 4 km³ in China will result in future shrinkage of these lakes, with catastrophic ecological impacts for densely populated areas in Kazakhstan, including Almaty with a population of over 1 million people (Bazarbaev, 2006; Baymagambetov, Popova, 2006; Mukhammadov, 2006). The eastern side of the lake would suffer more, while the western side, including the Ili River delta, may be more resilient, which is critically important for the proposed project.
With financial support from the European Union, CAREC prepared a report entitled “Project to develop an integrated Management Plan for the Ili-Balkhash basin” that proposes collaboration between Kazakhstan and China. An international agreement is currently under development with support from the United Nations Environment Programme (UNEP). In 2011, China and Kazakhstan entered into a preliminary agreement on the joint use of resources in the transboundary Ili and Irtysh Rivers through 2014.

In December 2012 during a presentation of the “Kazakhstan Development Strategy Through 2050”, President Nazarbaev touched on the issue of water deficits and tasked the government with developing a long-term federal programme to negotiate with neighbouring nations for mutually beneficial apportionment of transboundary rivers, a topic of especial importance in Kazakh-Chinese relations.

Despite these concerns, even if China increases its water intake, it is possible to preserve at least part of Lake Balkhash and its adjoining ecosystems. Similar to construction of a dam on the Aral Sea that enabled the sequestration and restoration of the Minor Aral Sea and surrounding ecosystems, Kazakhstan’s Institute of Geography has developed a dam construction project that would separate the western freshwater and eastern saline parts of Lake Balkhash. In the event of water shortages in the Ili basin, the construction of such a dam would facilitate conservation of the freshwater side of the lake, and, correspondingly, the Ili-Balkhash wetland ecosystems (planned area for the Reintroduction Programme).
4.2. Current resource use and required adjustments

There are small villages and family farms scattered across the majority of the project area, with the exception of the southern shoreline. While the population is low, people do occupy the entire region. In the area most suited to tiger reintroduction, there are approximately 10 settlements with populations between 20-1,000 people and family farms. Overall, there are approximately 500 known land-users, including 400 private (family) farms that house approximately 80,000 cattle and horses and 50,000-70,000 sheep. For the sake of comparison, in 1990 there were approximately 500,000 livestock of all types in the area. As of January 1, 2012, there are 207 registered enterprises, of which 170 were active, including 148 registered as smaller legal entities (Appendix 3). Significant portions of 1990s-era rental agreements have legal irregularities, and currently the Forestry Department is taking measures for early termination of these contracts.

The Ili-Balkhash region is only unevenly occupied. Average population density is 5.5 people/km². However, there are large areas belonging to the State Forestry Fund that do not have a year-round population (Figure 6). Population density varies from 3.0 people/ km² in the Ili delta to 11 people/ km² and more in the buffer zone. In optimal tiger reintroduction areas, looking at environmental and socio-economic indicators (Figure 6, Sections 1-4), there is either no human activity (Forestry Collective, Section 1), small hunting settlements that target muskrat (Section 3), or newly developing hunting and fishing tourism areas (Sections 2 and 4). During programme implementation, programme partnerships will be developed with these land-users.

The region has the smallest relative proportion of agricultural activities in the entire Almatinskaya Oblast. According to 2012 annual data, gross agricultural output in the Balkhash District totalled 10,481.8 million tenge (~$70,000 USD) or 3.1% of Almatinskaya Oblast’s total output.

**Agriculture.** The main economic activity in the study region is livestock agriculture – sheep farming, meat production, camel farming, and horse farming. Pastures occupy 20% of the Ili delta (Figures 4-5). Dryland and irrigated farming (the latter for rice production) are somewhat developed in the southern delta. 30-40% of agricultural land consists of tillable land not currently viewed as having tiger reintroduction potential.

Livestock production has a serious negative impact on ecosystems, not so much due to grazing impacts, but rather caused by regular agricultural burning by livestock owners. The fires result in reed bed and forest fires as well as the regrowth of new grass, tree, and shrub saplings that are ideal for grazing cattle, sheep, and goats. In addition, these fires destroy the oldest and most valuable tugai forest areas. Insufficient moisture leads to the loss of willow and poplar communities that provide the tugai forests with the primary tree coverage and support the development of thick and formidable grass and shrub underbrush.
Figure 4. Livestock agriculture in the project area
Figure 5. Agricultural lands in the project area.
Figure 6. Human population density in the proposed Programme implementation area.

1 - Existing protected areas (refuges, RAMSAR sites)
2 – Approved areas set aside for a National Park
3 – Optimal tiger reintroduction areas based on environmental and socio-economic variables (Areas 1-4, see Fig. 1, description in the text below).
Repeated fires result in the predomination of oleaster (*Elaeagnus angustifolia, E. orientalis*) and salt trees (*Halimodendron halodendron*). Tugai forests lose their unique biodiversity and area supplanted by thick “jungles” of savannah-like plant communities that are ever more convenient for livestock grazing and less attractive to wildlife such as wild boar and roe deer. Conditions required for Bukhara deer restoration also deteriorate. This type of development is common across the entire area.

**Hunting and fishing.** Year-round sport-fishing and sport-hunting have become very popular in this area. Despite strengthened enforcement by relevant hunting management agencies, poaching is a common problem. In recent years, more and more private hunting grounds are being established and legalized along the borders of nature refuges.

The main hunting species are wild boar, roe deer, hare, pheasant, and waterfowl. Hunting activity has been growing since the mid-1990s including the use of helicopters to drive wild boar and night-hunting using lights on off-road vehicles. Experts estimate that over 1,000 wild boar are killed illegally each year, an amount that is 30-40% of the total population and is leading to population declines as a result.

Fur-production enterprises have permission to harvest muskrat in deltas outside of nature refuges. This activity attracts hunters with families and livestock to the area.

Fishing is the main income source for a significant portion of the local population. Sport-fishing camps are distributed evenly across the entire area. The delta is famous for having huge catfish (up to 100 kg), which attract fishing aficionados from other parts of Kazakhstan and abroad. The delta is closed to commercial fishing.

**Tourism.** Tourism is under active development in the programme area, attracting both local and foreign visitors. Tourists are primarily interested in fishing. In the future, it may be possible to establish a resort-tourism zone.

In order to conduct the reintroduction programme in accordance with the region’s socio-economic development plans and local community interests, a comprehensive analysis of the current socio-economic situation in the region was prepared, including:

- Evaluation of socio-economic development of potential benefit for tiger reintroduction in the Ili River and Delta as well as along the southern shoreline of Lake Balkhash (prepared by the Institute of Geography of the Kazakhstan Ministry of Education and Science, using published data from the Kazakh Ministry of Agriculture, Almatinskaya Oblast Statistics Department, Appendix 1)
- Evaluation of possible reintroduction programme outcomes based on surveys of Balkhashsky, Iliysky, and Karatalsky Districts, northern portions of Aksuysky and Sarkandsky Districts and consultations with local government agencies (Prepared by Terra Remote-Sensing and GIS Centre, Appendix 2)

Using this analysis, the following recommendations were made for zoning the project area:

1. **Optimize the socio-economic and demographic situation.** In order to accomplish this:
   - Conduct a sociological survey to identify the most promising partners (indigenous organizations, families, entrepreneurs, etc.) prepared to support the programme.
   - Determine potential methods to engage local residents in programme implementation (including eco-tourism development, highly productive hunting territories, jobs creation for local residents as nature park staff, community observers network, etc.)
   - Conduct a series of informational meetings to introduce the programme, explain programme goals, tasks, and implementation phases, highlight ways for residents to participate and protect community interests (conflict prevention and resolution).
2. **Optimize livestock agriculture methods to reduce negative ecosystem impacts and increase productivity, including:**
4. Cultivation of highly productive and environmentally-adapted fodder crops (for example, forage kochia and crested wheat-grasses);
5. Cultivation of perennial grasses in low-yield pasturaleands;
6. Tick-prevention activities and mowing reed thickets as an alternative to agricultural burning;
7. Building livestock pens for protection from predators (including hotwire fencing).

3. Develop a loss compensation programme and provide advance notice to local residents that may experience losses. Plan for alternatives, including:
   - Livestock insurance plan with financial compensation for owner losses;
   - Animal replacement programme – in case of tigers’ prey, compensation in livestock rather than in a financial form in accordance to the scale of loss (successfully implemented over a 12-years period in Turkmenistan for leopard protection).

4.3. Existing Protected Areas and their development potential

Currently, the study area includes: 4 forestry collectives (Bakanassky, Kurtinsky, Karatalsky, and Burtlitobinsky) and 19 hunting territories with a total area of 517,000 hectares. There are three Republic-level comprehensive nature sanctuaries (Figure 3) for the protection of ecosystems south of Lake Balkhash: Pribalkhashsky (503,000 hectares), Karaoysky (509,000 hectares), and Kukansky (49,000 hectares). In summary then, there are over 1 million hectares in the Ili, Lepsy, and Akso river deltas under protection, and 40-45% of the area along the southern shore of Lake Balkhash.

All three of these Protected Areas (PAs) are comprehensive, established to protect ecosystems the species within them. The PAs fall into IUCN Categories III and VII. Hunting and forestry activities are not permitted within them. There are restrictions on economic activities, including timber harvesting, mining, and hunting, but in reality, these rules may not always be observed. Violations are primarily related to livestock grazing and hunting. Licensed sport-fishing, tourism, and beekeeping are permitted.

Karaoysky and Pribalkhashsky Nature Refuges overlap partially with Important Bird Areas (574,300 hectares) in the Ili Delta. In 2011, all three refuges were nominated to become Ramsar sites.

Pribalkhashsky Refuge is administratively linked to Altyn-Emel National Park, while Karaoysky Refuge is linked to Ile-Alatau National Park.

Improving the PAs network in the Ili Delta and southern Lake Balkhash regions

In order to ensure the preservation and restoration of ecosystems in the region, Protected Areas’ legal status must be strengthened and a new Republic-level Ili-Balkhash Nature Reserve established in place of existing refuges. These plans are already underway in Kazakhstan’s government as part of the “Zhasyl Damu State Programme for 2010-2014” (Republic of Kazakhstan decree № 924, dated 10 September 2010). In addition, a unified management plan for the region must be developed and implemented and should include various PAs. The areas connecting them should be viewed as ecological corridors and buffer zones where environmentally sustainable natural resource use is developed.

In 2009, a Scientific Rationale (SR) for the establishment of the Ili-Balkhash Nature Reserve in the Ili delta and southern Lake Balkhash was developed in the framework of the UNDP/GEF
KAZ/00/G37 (00013215) Project. The draft SR was approved by the Forest and Hunting Committee of the Ministry of Agriculture, Republic of Kazakhstan and received a positive evaluation through the federal Environmental Impact Assessment process.

In 2011, according to a joint agreement (№ 65, dated 10 March 2011) with the CFHM, Terra Remote-Sensing and GIS Centre undertook the “Developing a Technical and Economic Assessment (TEA) for the creation of a state nature reserve in the Ili River delta and basin”. Field research and an analysis of current land use in the area show that it is not currently possible to include some of the areas proposed in the SR, specifically parts the Ili, Karatal, Aksu, and Lepsy river deltas.

Considering current land use, it is not possible to completely allocate the lands required to establish a single unified territory. Because of this, the TEA presumes the inclusion of three clusters with a total area of 579,098.2 hectares for Ili-Balkhash Nature Reserve. The clusters are characterized by the presence of wetland areas and forest ecosystems with a high concentration of biodiversity and rare flora and fauna species:

1. Pribalkhashsky – 356,296.2 hectares
2. Ile-Zhideli Delta – 200,986 hectares
3. Ili River basin – 21,816 hectares.

Currently, the following approvals required for establishing a PA with a status of State Nature Reserve in the Ili River delta and southern Lake Balkhash within the boundaries of Balkhashsky and Almatinsky Districts have been received:

1. Pribalkhashsky section – 356,296.2 hectares (Figure 3, Section BSh). This area is characterized by high flora and fauna biodiversity, rare plant communities, desert-type shrub and forest ecosystems, and extensive wetlands listed under the Ramsar Convention.

   The Pribalkhashsky section has no land users. The area is distant from settlements; there is no economic activity. There are no railroads, and vehicles access the area on unpaved roads and tracks that are only minimally passable much of the year. Prior plans for construction of the Almaty-Astana road and a bridge over Lake Balkhash could pose a risk to tiger introduction, as the bridge would traverse the narrowest part of the lake in this region. The government originally commissioned the project proposal, but subsequent to the Environmental Impact Assessment and economic evaluation processes, Kazakhstan currently has decided against the project.

2. Ili-Zhideli Delta section – 200,896 hectares (Figure 3, Section I-Z). In the central and upper portions of this part of the delta, there are large areas of lowland and tugai forests combined with sandy expanses. There are settlements and a paved road along the eastern edge of the delta. Livestock agriculture is the local population’s main economic activity. Large numbers of cattle, horses, and sheep graze here. In recent years, industrial livestock enterprises have been established.

   The section also contains hunting grounds and private recreational facilities. There are outside land users here, occupying 87,048 hectares. Of these, more than half (48,860 hectares) are used by Otes-V Agricultural Company. Currently, land use in this area is temporary in nature, without any title documents, in anticipation of the fact that land use will soon be terminated. That action prompted by the need to protect unique tugai and wetland areas with high biodiversity in the middle of the delta. When the Technical and Economic Assessment for the establishment of either a nature park or nature reserve was under development, plans were made to pay compensation to landowners forced to cease land use activities as set out in the Republic of Kazakhstan Land Code.

   Tiger reintroduction in this area is possible in the delta lowlands adjacent to Lake Balkhash, as well as in wetland ecosystems. The majority of this area is not suitable for livestock grazing due to its inaccessibility. There are no settlements.

3. Ili River basin section – 21,816 hectares (Figure 3, Section IB). The Ili River basin section includes only lands belonging to the State Forestry Fund. Analysis of current land use indicates that despite the fact that the entire river basin is a water conservation zone,
there are areas under private ownership or long-term rental agreements that cannot be included in the PA. There are several sites where the local population is permitted to harvest firewood, gather hay, and use the land for recreation.

The area is suitable for tiger reintroduction, but is small and surrounded by lands used for agricultural purposes.

4. Karatal, Aksu, Lepsy river deltas and the Lake Balkhash shoreline section – at least 500,000-600,000 hectares (Figure 3, Section A-L). During the Scientific Rationale development phase (UNDP/GEF), it was proposed to create the Karatal-Aksuysk Reserve Zone, located along the southern shores of Lake Balkhash and in the northeastern part of the Ancient Bakanasskaya Delta, encompassing the deltas of the Karatal, Aksu, and Lepsy rivers. This area is entirely within the Kokansky Zoological Refuge.

Wild boar, roe deer, wolf, fox, jackal, weasels, wolverine, spotted cat, and tolai hare inhabit the lakeside thickets of Lake Balkhash in the valleys and deltas of the Karatal, Aksu, and Lepsy rivers and their tributaries. Muskrats live on the lake’s shores, on islands in river deltas, and in numerous near-shore lakes. The entire shoreline of Lake Balkhash stretching between the Pribalkhashsky section (Fig. 1, Section PB) and the Karatal, Aksu, Lepsy River Deltas and the Lake Balkhash shoreline section are suitable tiger habitat.

There are large hunting territories in the area with associated infrastructure, and hunters do not wish this area to be included in the Reserve. Portions of these lands are privately owned. In particular, there is an “additional” area used as a base camp for fishermen and hunters specializing in muskrats. This area should be converted into a state nature refuge without seizure of the land.

All of these areas are possibly suitable for tiger reintroduction, although the “Ili Basin” area is too small in area and surrounded by agricultural lands and villages. Looking ahead, reintroduction activities are not considered viable in that area.

The proposed “Ili-Balkhash State Nature Reserve” is planned to include two cluster-type territories: “Pribalkhashsky” and “Ili-Zhideli Delta” (Figure 1, Sections 1-2), which are situated in the Balkhashsky District of Almatinskaya Oblast. These places are the most suitable for tiger reintroduction.

Assuming the completion of a series of socio-economic activities, there are also potentially suitable areas along the lower Ili River basin, including the interfluvial Ili-Topar at the upper end of the Ili delta, as well as the Karatal, Aksu, and Lepsy river deltas. Lands not included in higher category PAs and that will not undergo land allocation or a change in ownership or conservation regime should be included in the Comprehensive Management Plan. This will account for community-based interests and optimize the region’s overall environmental status instead of only isolated areas. WWF has prior experience in preparing implementation mechanisms for comprehensive management plans in an Environmental Network that includes higher category PAs and significant areas of sustainable land and natural resource use in Tajikistan (an area of Tigrovaya Balka Nature Reserve) and in Kazakhstan (Turkestan, Syrda) to develop Management Plans. (http://www.wwf.ru/about/where_we_work/asia/kazakh/results2012).

Inasmuch as the land used by small farmers is dedicated exclusively to pasture and hayfields, it could be included in the reserve’s buffer zone if pasture use was effectively regulated. Actively used agricultural lands within PAs could be made available for those purposes to Kazakh citizens residing within PAs, as provided in Kazakh law. This is specifically relevant to the “Ili-Zhideli Delta” section.

Proposals relating to conservation-socioeconomic zoning (presented in detail in the Kazakhstan Institute of Geography analytical review) were developed during planning for the state nature reserve and reorienting the region toward development of “Green Economy” model.
Three main zones with varied recommended conservation levels and permissible economic activities were identified in areas where the Reserve is planned using objective descriptions of the ecological and socio-economic situation:

1. Strict conservation zone (core zone) intended for long-term conservation of genetic resources, biodiversity, ecosystems, and landscapes. Includes four areas with habitat optimization (including tiger reintroduction) and comprehensive environmental conservation potential;
2. Buffer zone which permits environmentally-sustainable economic activity and sustainable use of biological resources; and
3. Conservation zone intended for traditional natural resource use activities that have no negative impact on the reserve’s ecosystem.

In addition to those three zones, a transit zone (or sustainable development zone) with no specific conservation regime and established without seizure from local land-users has been identified. This area will only regulate those economic activities that could result in negative environmental changes in the conservation and buffer zones of the state nature reserve itself. Preference will be given to the development of sustainable agriculture and forestry, traditional local activities, and tourism based on the principles of balanced natural resource use.

For programme implementation, a system is needed that properly assigns zones and lands to one of two categories: 1) those lands suitable for habitat status optimization and tiger reintroduction and 2) lands needed for conducting socio-economic development to develop a “green economy” (integration of local socio-economic and environmental conservation development).

4.4. Conservation system and land and resource monitoring

OkhotZooProm is the agency responsible for the protection of rare plant and animal species as well as for hunting law enforcement. Oblast- and district-level forestry management agencies are responsible for enforcing forestry laws. The Ministry of the Environment and Water Resources administers national parks, OkhotZooProm, and forestry management agencies. The state fisheries inspection enforces fishing regulations. Here are the steps that these agencies will take to ensure that the tiger reintroduction will be successful:

1) Anti-poaching measures. Strengthening enforcement and management agency infrastructure; establishing special mobile patrol groups. Given the region’s characteristics and inaccessibility, particularly in reed thickets and tugai forests, optimal enforcement can be ensured by a combination of traditional patrol-based enforcement using off-road vehicles, periodic water-based patrols with motorboats, and air patrols (helicopters, planes, drones equipped with cameras). Land-based vehicular patrol enforcement is critical for restoring the ungulate population in transition areas and desert zones (goitered gazelle, saiga antelope).

2) Engaging local residents in alternative activities to improve living standards through community-based anti-poaching enforcement programmes on their lands (leased, village lands, etc.). In addition to direct enforcement, these measures play an important role in the conservation and restoration of habitats and poaching prevention.

3) Organization of new PAs and reorganization of existing PAs to incorporate ungulate habitats in the region. These measures are covered in section 4.3, “Existing Protected Areas and their development potential”.

4) Overall improvement of ecosystems, primarily halting agricultural fires that destroy vegetation and habitat and kill many animals. In order to accomplish this, enforcement and fire prevention are necessary, as is the introduction of sustainable livestock.
agriculture practices such as tick-prevention procedures, planting highly productive fodder crops, and mowing old reed thickets.

5) Developing a system of intensive hunting territories (including existing private hunting grounds) in ecological corridors and buffer zones. In addition to creating a network of higher category PAs, these enterprises can become important programme partners. Significant experience at both the international level and in Kazakhstan can be utilized to optimize enforcement, captive reproduction, and bio-technological measures (various fertilization techniques, feeding areas, salt-licks, and stimulating reproduction by regulating the sex-age structure of population groupings, etc.). Specifically, prior experience with the Karachingilsky Hunting Enterprise, situated near the project area and with the same combination of ecosystems and species, may be very helpful.

In order to increase land-users (owners and lessors) engagement, there must be a means of stimulating their enterprises. Under this system, a portion of the stock could be used to organize well-regulated hunts, another portion harvested directly, and a third portion used to enrich natural ecosystems. This activity could be a relatively rapid means of increasing wild boar populations thanks to the high reproductive capacity of this species.

6) Organizing regular monitoring of ungulate populations in the region, including assessment of predator impacts on ungulates. Currently, governmental funding is provided for regular population surveys conducted by specialised governmental services, OkhotZooProm and the Zoology Institute. However, in order to realize this programme and implement specific biotechnical measures in each area in-depth baseline research is needed, including an analysis of the sex-age demographics of population groupings, reproductive effectiveness, and the causes of non-anthropogenic mortality.

4.5. Status of ungulate populations and measures for their restoration and growth

The southern shoreline of Lake Balkhash, the Ili River valley, and adjacent semi-desert and desert areas once possessed significant diversity in the species that served as primary prey for tigers. The current population numbers are given on the basis of regular census and additional survey of the area. Estimations of the potential population growth for each species are presented on the basis of conventional models based on the average reproductive potential of those species in the environmental conditions of the project area. The conventional model took into consideration various approaches and methods towards population modelling reviewed in the papers of P.A. Stephens et al. (2003) and K.U. Karanth et al. (2004). Besides that analytical approaches and formulas were used developed by O.L. Revutskaja (2011) and V.G. Petrosian (2012). Some details of these approaches are presented in Appendix 12.

Science-based modeling - PHVA /PHV - will be proceeded during the initial phases of the program implementation taking into account various factors and different scenarios.

**Wild boar** (*Sus scrofa*) – is the most common and numerous species across all of the wetlands. Individual animals, groups, and litters of young have also been observed in deserts nearby reed beds, where the boar digs for roots and *Halostachys caspica* shrubs. Expert analyses find that there are 3,000-5,000 animals in the Ili River delta, an amount that significantly exceeds official surveys. These new numbers are based on survey data that incorporate annual illegal takes. In the past, wild boar was the tiger’s main prey species across all of Central Asia. Anthropogenic impacts, primarily illegal hunting and poaching, fires, and competition and disturbance from pastured livestock have changed the boar’s distribution. Obviously, the degradation of tugai forests and
hunting pressure has displaced wild boar into more inaccessible reed beds and high-grass areas. A broad food spectrum leaves wild boar populations in Asian ecosystems less dependent on the productivity of periodically productive species (such as beech, oak, and Korean pine in other parts of the range). At the same time, it is relatively simple to rapidly increase the wild boar population using simple biotechnical measures, including, for example, feeding stations.

The density of boar populations in Central Asia ranges from 16-20 to 50-60 animals per 1,000 hectares. In mountainous nut tree forests, a very high population is a natural occurrence, while in tugai ecosystems, the same levels can be achieved using biotechnology and supplemental feeding. Stable population density for a variety of ungulate species in Karachingilsky State Hunting Enterprise is illustrative (Baidavletov, verbal communication): in recent years in typical mosaic tugais on the left bank of the Ili River, survey work has shown the Bukhara deer population to be stable at 350-400 animals, with 380 roe deer and approximately 400 wild boar over a total area of 20,000 hectares. That is approximately 1,200 ungulates over 20,000 hectares or 60 animals/1,000 hectares. This density was achieved by using special biotechnical measures (primarily winter supplemental feeding). On the other hand, the territory’s scarcity (it is fenced all around) is a barrier to the natural dispersion of animals, lowering the rate of reproduction.

For the calculation purposes, we assumed the average reproduction rate for a wild boar population to be 50-100% per year. This is quite accurate for assessing wild boar; it is realistic under favourable conditions to achieve optimal population density in the ecosystem, and the gain could be significantly higher. Assuming favourable conditions and that poaching is stopped completely in the project area, a population of 20,000-25,000 wild boar could be achieved in just 3 years. It is not possible to guarantee optimal development conditions immediately across the entire territory, however, it is possible to achieve that growth rate and achieve high boar population density in localized areas (mainly at intensive hunting enterprises), which would permit the release of the first group of tigers. After 5-7 years, the boar population could reach 30,000-50,000 animals over 50% of the project territory, and as a result make the initial development of a sustainable tiger population possible.

Bukhara deer (Cervus elaphus bactrianus) was once commonplace and a significant prey species for tiger, but this species has disappeared from the area in question. There are excellent and significant areas of the animal’s habitat remaining in the Ili River basin and delta even today.

For Bukhara deer, population densities often significantly exceed that of other red deer subspecies in natural ecosystems. For example in Kyzylkumsky State Reserve (Uzbekistan), a stable Bukhara deer population of 150 animals lived for many years without any biotechnological support in a 5,000-hectare tugai forest (density of 30 animals/1,000 hectares). In Baday-tugai State Reserve in 2011, the Bukhara deer population reached 660 deer without any support occupying over 6,000 hectares (over 100 animals/1,000 hectares, Pereladova, 2013). With sufficient water and a density of 50-60 deer/1,000 hectares, there is no observable ecosystem degradation or tree growth suppression.

On average, a deer population grouping can grow 25-30% per year, however, such growth only occurs in populations of over 50 animals. Therefore, it is planned to release 50 deer each year in subgroups of 10-15 animals in several areas over the course of 4-5 years.

Methodological approaches and significant experience used in reintroducing the species at the Karachingilsky State Hunting Enterprise in the 1970s can be used for Bukhara deer reintroduction in tugai ecosystems. Current knowledge was summarized by N. Marmazinskaja (2012).

Several adaptation enclosures must be built at future release sites to allow the formation of optimally balanced (by age and sex) groups for release. Moreover, holding groups in enclosures for up to 6 months will facilitate the formation of social relationships and develop ties to a specific area, which will prevent dispersal upon release. Animals from Karachingilsky State Hunting Enterprise could be used initially for reintroduction. The current population there permits the removal of up to
several dozen animals each year without damage to the enterprise. In addition, removal of certain age and sex groupings will stimulate reproduction.

**Roe deer** (*Capreolus pygargus*) is rare, but can be found across the region. Fire and unregulated hunting are the primary negative influences on the species. The area of habitat suitable for roe deer is significantly smaller. Its habitat is mainly tied to oleaster, oleaster-Asiatic poplar, oleaster-salt tree, and oleaster-reed plant communities of the savannah type. Roe deer also have relatively high reproductive potential, and with proper conservation enforcement it would be possible to restore a population density of 10-15 animals per 1,000 hectares over a 3-5 year period, and beyond that, up to 20-30 animals/1,000 hectares.

Arid areas along the river valley are populated with **goitered gazelles** (*Gazella subgutturosa subgutturosa*), a species that remains rather commonplace (the population is estimated at approximately 3,000 animals). A small population of **saiga antelope** (*Saiga tatarica*), no more than 150 animals, remains in the Ili-Karatal interfluve and in the Sary-Esik-Atyrau Desert. Organization of reliable conservation enforcement would allow the formation of a goitered gazelle population of over 10,000 animals, as well as population growth for saiga antelopes. Under advantageous conditions, population growth for these species could reach 50% per year. There is an excellent example of the restoration of a saiga antelope population in Betpakdala, Kazakhstan, where, despite an initially imbalanced sex ratio (less than 2% of the population was male due to selective poaching at the time that effective enforcement began), the population rose from 2,900 animals in 2003 to 156,000 in 2013.

There are similar examples of population growth for goitered gazelles (Dzheyran Ecocentre, Uzbekistan, Ogurchinsky Island, Turkmenmenistan). These examples enable such predictions for achieving population growth goals of 10,000 animals over a 3-5 year period (while accounting for a potential rise in mortality during adverse winters).

Another characteristic species in arid landscapes situated along river valleys and deltas is the Asiatic wild ass, or **kulan** (*Equus hemionus*). It is also a potential prey species for tiger in the transition zone between delta and desert. Kulans have vanished from the area, although the habitat’s status would permit successful kulan reintroduction in Sary-Esik-Atyrau. There is significant past experience in reintroducing Asiatic wild ass not only in Turkmenistan but also in Kazakhstan. All reintroduced populations were sources from Badkhyz State Reserve in Turkmenistan. Past experiences reintroducing kulan in the Republic of Kazakhstan were assembled into a set of methodological recommendations (Flint et al., 1988). Past reintroduction successes have permitted, in part, the establishment of a stable, sustainable, and growing Asiatic wild ass population in Altyn-Emel National Park – on the right bank of the Ili River and Kapchagaysky Reservoir – which could be a source for resettlement to Sary-Esik-Atyrau. When kulans are moved across such short distances, there is little need for adaptation to local ecological conditions. Accordingly, all that is required is a system of temporary (up to 6 months) adaptation enclosures to establish the group’s social structure and to repress migratory efforts that can rise sharply from transport.

The sands of Sary-Esik-Atyrau occupy approximately 10 million hectares, a significant area along the southern shores of Lake Balkhash and are included in the kulan’s historical range. Given the arid climate, the absence of watering holes during summer months, and severe winters, this region is only minimally used for livestock agriculture. For the kulan, grazing land quality is significantly higher than in most parts of the current range where the population has been restored in recent years. The most conservative estimate is that up to 10,000 kulans could reside here. Such a population could be a significant addition to the tiger’s prey base year-round, including at summer watering holes. There is a well-developed protocol for creating artificial population groupings of kulan. Importing 50-100 wild asses per year over a 3-4 year period can result in a population of 1,000-1,500 animals after 10 years.
In addition to ungulates in tugai forests, there are a variety of species that have been tiger prey in the past and could be useful during reintroduction as additional prey species in transitional areas and adjoining desert. An additional set of measures is required in order to restore ungulate populations that are also subject to human hunting. No particular targeted measures are needed to restore most of these other species. Restoration will occur as anthropogenic pressure is reduced thanks to improved enforcement measures and, importantly, through the introduction of ecologically sustainable land use, including cessation of large-scale agricultural burning.

Study of the tiger in the southern Russian Far East has shown that the ratio of tiger population to ungulates should be 1:300 (Smirnov, Miquelle, 2005; Goodrich et al., 2010; WWF-Russian Far East reports). In studying 10,000 hectares of the tiger’s individual home-range in the Russian Far East, the total density of all ungulates should equal approximately 30 animals/1,000 hectares. In Central Asia, the densities of both tigers and ungulates were significantly higher. In Karachingilsky State Hunting Enterprise, the total ungulate population density in the last several decades held stably at approximately 60 animals/1,000 hectares.

Thus, the area will be ready for the release of tigers when:

- There are no fewer than 100,000 hectares (in the first potential reintroduction sites) established and under a reliable conservation regime, both legally (official status as a PA) and empirically (no poaching, no unauthorized land-users and/or all remaining land-users are engaged in various aspects of the programme’s implementation) in the model area;
- All uncontrolled livestock agriculture and agricultural burning is terminated within the planned tiger release area;
- In places where limited livestock grazing remains, modern approaches will be used (fodder crop cultivation, anti-tick treatments, mowing reed beds) and livestock is protected from potential tiger attacks;
- The ungulate population is growing significantly, and the total population density reaches a minimum of 30 animals per 1,000 hectares; and
- Veterinary study affirms the epizootic safety of the potential release area.
5. Tiger reintroduction in the Ili River-Lake Balkhash basin

5.1. Sourcing animals for introduction and formation of the tiger population.

The range of the Caspian tiger is at a significant distance from the distribution range of other subspecies, a fact that permits the supposition that there are significant genetic differences. DNA analysis has compared the haplotypes of all tiger subspecies using tissue samples of Caspian tigers (20 animals) taken from museum specimens collected along the Great Silk Road (Driscoll, et al., 2009). It has been shown that the Caspian tiger does not vary significantly from the Amur tiger. On the other hand, these two subspecies have significant genetic differences from the other subspecies, which allows the presumption of their phylogenetic affinity.

Fig.7. Genetic connections among tiger subspecies (according to Driscoll et al. 2009)

The genetic proximity of the Amur and Caspian tigers foreordains the selection of a subspecies to reintroduce in Central Asia. It is noteworthy that of all tiger subspecies, only the Amur and Caspian tigers are adapted to life in true winter conditions and to snow cover, and thus the use of Amur tigers for reintroduction in Central Asia tremendously simplifies the adaptation process to new ecological conditions.

The tiger reintroduction process can be carried out using various methodological approaches. Theoretically, 1) tigers from zoos; 2) wild tigers following rehabilitation, including captivity-raised cubs; 3) and adult tigers specially captured from the wild could be used.

Tigers from zoos. In the world’s zoos, there is a significant number of pureblooded Amur tigers. As of June 2013, 185 zoos and breeding facilities contained 486 Amur tigers with genotypes
representing 98% of the genetic diversity of 85 foundation animals. Animal breeding is actively managed within regional programmes, with a goal of retaining genetic diversity. The Amur Tiger Global Species Management Plan (GSMP), under the World Association of Zoos and Aquariums (WAZA), provides a framework for those regional programmes to work together to maintain a sustainable ex situ managed population. The GSMP also serves as a review and advisory board for issues related to the interface between ex situ and in situ populations of Amur tigers.

An alternative source is the tiger population in the southern Russian Far East. Tiger conservation in the Far East is given a great deal of attention – the PAs network is expanding, biotechnology is used to increase ungulate populations, anti-poaching brigades are established, educational outreach is ongoing with local residents, etc. The Russian Federation Ministry of Natural Resources and Ecology developed and approved a decree entitled “Strategy to protect the Amur tiger in the Russian Federation” on 2 July 2010 (№ 25-r). In recent decades, the population has varied between 450-500 animals with approximately 100 cubs being born annually. Unfortunately, several dozen tigers die each year being killed by poachers or are killed crossing roads, in conflict situations, etc. Against that background, removing 3-5 tigers per year to resettle them will not have a negative influence on the population, particularly if the captures take place in population groupings with a significantly higher local density and corresponding age-sex structure. This data is currently available thanks to long-term monitoring research including the use of camera-traps. Data from a global tiger census planned in the Russian Far East during winter 2014-2015 and an expert assessment of the proposal to remove wild tigers from particular subpopulations (without negatively impacting sustainability) will inform the final decision on removing adult animals from the wild.

Challenges of using tigers from differing sources

The release of captive-bred tiger cubs and animals from zoos is theoretically possible. Almost every year there are orphaned tiger cubs found in the Far East that cannot survive independently in the wild. After being held in specialized centres, they are either transferred to zoos or breeding centres or returned to the wild. As of the moment, different researcher teams have conducted dozens of such experiments. Rehabilitation centres in Primorsky and Khabarovsk Krai periodically also receive adult tigers (for example, as a result of wounds or those caught and removed from conflict situations) which are also returned to the wild following rehabilitation.

One of the first such successful returns of tiger cubs to the wild took place in 2001. A documentary film entitled “Tiger Odyssey” was made about the story (http://www.youtube.com/user/zovtv#p/u/7/A1JQiF43cQ). Another example of this phenomenon is the return of the tigress Angara, captured in early 2008. She was moved to the Utes Rehabilitation Centre, where measures were taken to prepare the animal to return to the wild. Prior to her release, a windstorm resulted in her cage being destroyed. The tigress left the enclosure, and there have been no reports of conflict situations attributed to her or to her being killed. The tigress Roskosh was held for more than 18 months in a Far Eastern rehabilitation centre before escaping and successfully overwintering. Unfortunately, she was killed by poachers a year after her escape. Zolushka, an orphaned cub, lived in a rehabilitation centre from the age of 6-7 months. After her release in May 2013 (at almost 2 years of age), she lived for at least 6 months in the wild, and camera-traps showed her interactions with an adult male living in the same territory.

There have been successes relocating 2 female tigers from one part of their range to another. In 2010, a female approximately 6 years of age entered an area containing a horse-breeding facility and killed a horse before being captured by staff from the Hunting Oversight Administration (Department, today) (RAS-RFE, Wildlife Conservation Society). The same day she was moved a significant distance away from the settlement and future observations revealed her successful adaptation to new conditions (the tiger was observed for 18 months) (WCS report). In 2012, a female tiger (2-3 years old) attacked household dogs near the village of Solontsovy, after which she was captured by staff from the Khabarovsk Ministry of Natural Resources, RAS-RFE, and WCS, and was relocated to an uninhabited area that same day. At the moment, her adaptation process has been proceeding smoothly, although the federal RosPrirodNadzor agency forbade equipping her with a radio-collar.
Unfortunately, there has been a series of reports of tiger cubs dying after being released into the wild. Additional data analysis must be done on each released animal. There is not a single documented case of successful reproduction in animals returned to the wild. There have been a number of incidents of released animals being killed by poachers, and several released tiger cubs were killed after entering populated areas.

The process of returning hand-raised tigers to life in the wild is very complicated. Individual animals have difficulty learning to hunt and to avoid humans. There is a significant likelihood of released animals getting into conflicts with local residents or attacking domestic livestock. Despite significant global experience, mainly in India, reintroduction using captive-raised tigers is only successful 11% of the time (Beck et al., 1994). Accordingly, when the reintroduction programme was under development in India, the main emphasis was placed on capturing wild tigers and using a “soft” release strategy of releasing them after a brief holding period and ensuring that their ability to hunt wild prey was retained (Ramesh et al., 2011).

When raising animals in captivity, a number of specific methods should be employed to prevent animals from becoming accustomed to humans or becoming accustomed to consuming domestic livestock. These methods have been described in detail for a number of predators. However, being a larger and potentially more dangerous predator, the tiger demands even greater attention when being prepared for release. In the Russian Far East, it is possible to test the proposed methodologies and monitor adaptation to life in the wild. These methodologies continue to be fine-tuned in other specialized centers. Specifically, Gary Koehler, Maria Fabregas and others are assisting Save China’s Tigers in an experiment to “rewild” a group of former zoo-born tigers and their offspring in a specialized center in South Africa with the goal of releasing them into habitat to be restored in southern China. An analysis of this experience could be used to realize a similar programme in Kazakhstan.

In any event, because preparing the area for the future release of tigers will occupy at least 5 years, it is entirely likely that these preparation methodologies for animals living in breeding facilities, rehabilitation centres, and zoos to be released into the wild will be successfully developed and their effectiveness documented. This raises the possibility of using captive-bred tigers for reintroduction.

Translocation of mature tigers captured in the wild has certain advantages, particularly because these animals are skilled hunters and avoid human contact. All such captured tigers should be tested for dangerous infections and illnesses that should not be allowed to infect the population being formed.

Capture. Methods for capturing adult wild tigers, their transport, the adaptation process, and subsequent release have been used numerous times for tiger reintroduction in India. Specifically, the protocols for immobilization, animal handling, and translocation are described in Standard Operating Procedures (SOP) used in resolving emergency situations in the event of human-tiger conflicts in densely inhabited landscapes. India’s Ministry of the Environment and Forestry prepared the document. In the protocols, after animals have been examined by a veterinarian and translocated, they are placed in a large enclosed area containing natural vegetation and a large number of ungulates (in the tugai, mainly wild boar). When observations show that the animal has begun hunting successfully, part of the enclosure is removed in order to allow the animal to return to nature.

Numerous tigers have been captured over a long period in the Russian portion of the Amur tiger’s habitat in the Far East in order to equip them with biometric and satellite monitoring devices for research, particularly to determine individual animals’ territories, track movements, etc. Aldrich foot snares are used for these purposes. Beginning in April 2012, RosPrirodNadzor enacted limitations on the use of Aldrich foot snares for capturing tigers.
In India, tigers are generally immobilized without entrapment for relocation purposes. A shooter waits for a tiger on a *machan* platform placed high in a tree. It is preferable to choose a habitat where the tiger’s movements can be readily observed after being darted, since it may take 10-15 minutes for the tranquilizer to take full effect. Air rifles with air-borne needle darts are used most often, and the darts contain a mixture of xylazine and ketamine. Prior to darting, the animal is visually assessed for physical condition and approximate weight for dosing purposes. However, in the Far East, environmental conditions (forest type, climatic conditions) and the size of individual territories make it challenging to use that approach. It is possible that the methodology could be polished and adapted to local conditions. Traps that use a baited cage for live-capture could be promising with additional testing. That system is used successfully to capture leopards and has a much lower risk of trauma for the animal.

A final decision on the primary source of animals for reintroduction has not been taken; protocols will be developed during the next phases of the Programme implementation using the results of ongoing experimental activities.

The feasibility of reintroducing tigers from zoos will depend on the decision of the Government of Kazakhstan to establish and fund construction and annual operating costs of a special center for tiger breeding and reintroduction preparation (minimum $5 million USD for design and construction, $1 million USD for operating costs). In the event of an affirmative decision, center construction and operations can operate independently of preparation of the programme area for tiger releases and may start in parallel with the major activities of the first phase of the Programme. Only second and third generation tigers raised by mothers in semi-wild conditions with limited or no human contact can be released.

The Programme also envisions the participation of IUCN specialists and leading international specialists on tiger biology, “rewilding” and population restoration. Specialist participation will occur as required for the detailed preparation and implementation during relevant Programme phases.

The final decision about sourcing animals for reintroduction (from zoos, young or adult tigers from rehabilitation centres, or targeted live capture in the wild) must be made before completing the initial phase of the programme and should incorporate the latest data and analysis of current experience. However, live capture of wild animals followed by a brief period of adaptation and a soft release is the primary strategy under consideration at this point.

**Developing tiger groupings.**

The establishment of several reintroduction centres in the project area provides the best conditions for a sustainable population of the species. As the population grows and spreads over a greater area, the groups will come into contact and ensure an exchange of animals.

In order to evaluate optimal sizing for foundation groups and the potential tiger population growth rate, we analysed data relating to tiger populations in discrete Far Eastern reserves. Specifically, the Sikhote-Alin Reserve’s tiger population began at 3-4 tigers and after 10 years, the population exceeded 10 animals. After another 7 years, there were 20 tigers, and after that point, the population grew very slowly to 30 tigers over the next 15 years. However, after achieving the initial critical population of 10 animals, the reproductive success of the group increased by 50%, almost double the group’s reproductive success: a 30-50% increase in the number of females bearing litters, infant survival increased, and the size of litters increased. The subsequent observation of a more gradual population growth despite increased reproductive success is probably due to maturing tigers dispersing beyond the borders of the nature reserve into adjoining sparsely inhabited areas.

Another example is the modelling used to develop the tiger reintroduction programme in India (over an area of approximately 200,000 hectares containing 15 villages). The model uses data that averages tiger habitat areas in similar biotopes with corresponding population densities of 10.7
animals/100 km\(^2\) and a 95\% confidence interval of 7.9 to 14.6 animals/100 km\(^2\). The model accounts for the 8 primary parameters of population development. The authors created 6 development models for the population grouping that depend on the influence of additional factors. As a result, the optimal scenario had an initial composition of 2 males and 4 females (this combination would be established by bringing in animals gradually over 2-3 years) and then would either add or replace 2-3 animals every 3 years over a 10-year period. In that scenario, a stable population of 20-24 animals could be achieved in 10 years, and future growth would be achieved by ensuring sufficient ungulates population density (tiger demand for ungulates of various weight and sizes is approximately 50 animals per year per tiger, assuming optimal territorial density). In any event, development modelling for a concrete tiger grouping must account for at least 8 parameters including ungulate population/density, mortality, climate, and other factors (Karanth et al., 2003, 2004; Goodrich et al., 2010; and others; **Appendix 12**). Such modelling and calculations of growth dynamics for specific tiger populations can take place in 5 years after phase one of the programme is complete and there has been significant growth in ungulate populations.

At this stage of the programme’s planning, four main reintroduction areas can be proposed. Figures 1 and 6 show the locations of existing protected areas and lands that have already been approved for inclusion as core parts of the national park (“Terra’s sections”). The figures also show lands that are optimal locations for reintroduction sites (“WWF’s sections”). A significant portion of these areas are outside the boundaries of existing or planned protected areas (sections 3 and 4) because hunting enterprises were also viewed as potential partners, as experience in the Russian Far East and Kazakhstan has shown that their effectiveness can be even greater than that of PAs.

Accordingly, over the first 2-3 years in each area, the reintroduction process should establish groups of 3-4, maximum 6, animals- founders (1-2 adult males and 2-4 sexually mature females). If possible, release of another 3-4 animals over the next 3-4 years, thus achieving the optimal number of foundation animals for the group (10) is required to increase reproductive potential and begin assimilation of areas surrounding the main territory. It is more acceptable to use zoo and rehabilitation centre tigers in section 1 above, because there are no human land users or livestock grazing, and thus a minimal risk of conflict situations. Each area’s readiness and an evaluation of when to begin the reintroduction phase should be determined using an evaluation of initial preparatory programme components, including the key parameter – achieving the required ungulate population density.

**Thus, schematically speaking, programme realization could take the following form:**

<table>
<thead>
<tr>
<th>Programme phase</th>
<th>Main activities for the programme phase</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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<tr>
<td>Preliminary</td>
<td>Programme negotiation and confirmation, initial financing, identifying partners/responsible parties</td>
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| Phase 1         | **Socio-economic preparation:**  
|                 | Sociological surveys **                                                                            |      |      |      |      |      |      |
|                 | Identify specific territories and allocate funding – development of a support system for families    |      |      |      |      |      |      |
|                 | Community engagement, small business development within programme framework                         |      |      |      |      |      |      |
|                 | Development of a compensation system for tiger kills of livestock (including identification of funding sources) |      |      |      |      |      |      |
|                 | Inform local population of the compensation system and its procedures.                             |      |      |      |      |      |      |
Establishment of PAs and a unified management system
Optimization of anti-poaching enforcement system
Development of an intensive hunting enterprise system
Comprehensive measures to optimize ungulate populations
Monitoring programme implementation
Site selection for adaptation/pre-release enclosures
Implement safety precautions in settlements bordering the planned tiger release and population growth area.
Determination of animal sourcing/methodologies
Independent research/evaluation of site preparedness for release (Community engagement, livestock removal, ungulate population density of 30 animals/1,000 hectares or more)

- Main activities related to programme component implementation, initiating comprehensive efforts within this component
- Long-term working development of this programme area

** The first sociological surveys began in June 2014 using funding provided by Citi Foundation. The survey seeks to identify families open to resettlement or communities willing to restructure the local economy in ecologically-sustainable ways compatible with the goals of the Programme.

Preliminary work with the local population has revealed serious concerns of people associated with the appearance of tigers in nature. This worries and oppositions were sounded at the meetings of land-users of the area as well as stated in the letters sent to the state authorities of RK and WWF. In this connection with that, the government authorities of the Republic of Kazakhstan took a decision to fence the major area for tiger releases into the wild. In particular, it is proposed to fence the Pribalkhashsky cluster of the reserve (340 thousand hectares approved for allocation for the reserve). Financing the construction of the fence will be provided within the governmental - business partnership.

In the event that independent evaluation of release site preparedness establishes that the area is ready, Phase 2 of the programme will start: construction of a system of enclosures, initial and repeat tiger deliveries. This Phase will take not less than 5-7 years.

The long-term Phase 3 of the project will be devoted to comprehensive monitoring, veterinary oversight, environmental education, and programme outreach (all these components should begin at initial Programme onset), livestock compensation system (as needed), and monitoring tiger population grouping development. This phase should extend at least 5 years after the final releases of tigers into the wild.

If the Government of Kazakhstan takes a decision to establish and fund construction and annual operating costs of a special center for tiger breeding and release preparation, infrastructure establishment and center operations can operate independently of preparation of the Programme area for tiger releases and thus can proceed in parallel with the major activities of Programme Phase 1. Tiger releases can only occur when the territory is ready – and only using second/third generation tigers raised by mothers in semi-wild conditions with limited or no human contact.

5.2. Site selection and outfitting for adaptation process and release
Several temporary adaptation centres must be built in planned tiger release areas. The holding pens are necessary for both quarantine purposes and to permit the tiger to adapt to the area. Site selection for each enclosure will be decided at the end of Phase 1 of the programme, when there is a better understanding of the spatial distribution of the ungulate population as well as other types of human activity. Obviously, it will be preferable to site the enclosures in areas with high densities of ungulates, an absence of livestock, and, preferably no long-term residents.

Infrastructure and access roads are not required components. In the event of their absence, animal transportation to the enclosures may make use of helicopters. A temporary field camp will be built for veterinary specialists and technical staff responsible for the care and study of tigers.

Each temporary adaptation centre will require the following:
- Enclosures for incoming tigers (Indian reintroduction practice has shown that enclosures may be relatively small, but not less than 1-2 hectares);
- Enclosures for reserve ungulates – main prey species (wild boar) – to be released into tiger enclosures; and
- Installation of trailers for staff housing and field laboratories.

After exact adaptation enclosure sitting determinations and funding and funding source decisions have all been made, plans shall be made for construction that account for the experience and recommendations of similar programmes.

Adaptation centres should include a network of 3-4 enclosures of 1-3 hectares each in size, made with sturdy metal fencing, and surrounded by a shared secondary opaque perimeter (plastic or organic materials, for example, reed mats). One tiger will occupy each enclosure, and several adjoining enclosures permit the simultaneous preparation of a corresponding number of animals. Proximity between enclosures permits the individuals to establish contact, simplifying future relationship-building between the tigers. Each enclosure should have a permanent freshwater source alongside which the animal could be immobilized if necessary, shelter, and other elements. Cameras must be installed to ensure around-the-clock monitoring of the animals. In addition, the design must allow prey animals to be released into tiger enclosures without human contact. Doors and gates must be remotely operable. A system of doors and gates for the enclosures should permit animals to exit directly into the wild following the adaptation period.

Total fencing of the major territory for tiger releases does not require special design, and may be limited to a construction of a wire mesh fencing around the perimeter.

5.3. Technical and legal aspects of reintroduction

Preparing documentation for transportation and veterinary procedures

All requirements must be met when importing animals into the Republic of Kazakhstan. This includes an import customs declaration (the process varies when bringing in tigers from Russia with their customs union, versus imports from zoos in other parts of the world), CITES permissions, veterinary certification in accordance with regulations and laws existing at the time of transport (there may be differences in imports from Russia versus from other countries). A mandatory quarantine period must be observed upon arrival at the reintroduction centre. Plans for transportation should consider both documentation procedures and the time necessary to complete required veterinary procedures before and after transport.

Transportation
Regardless of the source country of the tigers being brought in, they will be sedated for transportation. After immobilization, necessary biometric measurements will be taken, samples collected for veterinary purposes and genetic analysis, and immunizations administered.

Containers will be prepared specially for transporting the tigers and should completely meet the parameters laid out by the International Air Transport Association (IATA).
Transportation of animals will take place using airplanes travelling to Almaty airport, the closest airport to the release site. The animals will be delivered to the reintroduction centres using the same transportation containers either by land vehicle or by helicopter.
6. Monitoring programme success

6.1. Monitoring ecosystem status and tiger and ungulate populations

The current status of the project area and its various ecosystem types were described in details during the scientific justification process of creating the nature park, as well as during preparations of descriptions of Important Bird Areas and Ramsar sites. These descriptions are expected to change significantly as programme components aimed at ecosystem restoration are implemented (particularly efforts to restore forests, normalize rangeland loads, and halt agricultural burning).

At the moment, annual surveys of ungulate populations are conducted with state funding. This survey data will enable tracking of population dynamics for key species.

Annual total population surveys and detailed monitoring of populations (territorial distribution, sex-age composition of individual population groupings, reproductive success, mortality and its causes, etc.) are required for programme goals.

Monitoring socio-economic development, successes in educational programme components, and the implementation effectiveness of sustainable natural resource use methods is no less critical.

The following oversight is required on an on-going basis from the programme’s outset:

- Ecosystem status,
- Population and sex-age composition of ungulate populations,
- Degree of anthropogenic impacts (grazing, poaching, fires), and
- Socio-economic condition of the region and the level of public awareness/engagement in the programme.

Monitoring data will permit tracking of the effectiveness of measures undertaken, increases in the land area suitable for tiger habitat as a result of forest restoration, prey base adequacy, and the preparedness of the local population for the release of tigers into the wild. Monitoring data can be used to make timely adjustments to annual work plans (“feedback”) and to successfully achieve programme results. Ongoing monitoring of ecosystem status dynamics, ungulate population dynamics, and socio-economic development dynamics can serve as the basis for planning transitions to subsequent programme components.

Only by collecting necessary monitoring data to confirm positive development dynamics will it be possible to transition to the main phase – reintroduction. Moreover, during the transition to the reintroduction phase, periodicity and baseline monitoring parameters will not change, though information will also be collected on the tiger population, and on potential conflict situations that might arise.
6.2. Organizing and conducting research

Tigers held in adaptation enclosures should be monitored constantly, including through the periodic collection of faecal samples to determine the physiological condition of the animals, to identify any needed changes in care and feeding or veterinary intervention. Moreover, this work should take place without any researcher contact with any tigers that are intended to be released into the wild.

Because of the unique nature of this project, it is critically important to track animals following their release (movements, territorial expansion, and, in the future, contacts with other tigers). Today, the most optimal means of collecting this information is by equipping animals with satellite-tracking collars or radio-collars. Based on experience in the Far East, “standard radio-collars will function 4-6 years, and their failure rate is less than 5%, while GPS-collars prematurely fail in over 50% of cases” (Miquelle et al., 2011). Unfortunately, in tiger work in the Far East and in experience equipping other species with GSP-collars, there have been situations that could be interpreted as the collars having a negative impact. Therefore, for the time being it is anticipated that not all animals will be equipped with collars upon their release. Methods and technology are constantly being improved, and the selection of optimal monitoring methods should be done in consultation with global experts during preparations for release. Animals should be equipped with collars while immobilized during the transfer into the adaptation enclosures in order to limit the need for additional immobilizations immediately prior to release.

Traditional tracking and sample collection as well as the use of camera-traps are important monitoring techniques that can be used in addition to individual monitoring. Camera-traps can not only determine the presence of tigers in an area but also track individual animal movements. In order to complete these tasks, it is desirable to photograph each animal prior to release, as each tiger’s stripes are unique. Camera-traps should be deployed along the edges of the release area, in areas most likely to be travelled by animals, and on trees likely to be used as marking sites. Such trees can be identified using expertise on typical tiger preferences and by relying on biological concept of biological communicative field elements - “attractors”. To the extent that tigers disperse into the area, camera-traps can be deployed on wildlife trails (and crossroads) as well as at preferred marking trees.
7. Organizational and financial support

The programme includes comprehensive activities in a variety of focus areas (socio-economic, outreach, applied conservation) that can only be realized by working in close cooperation with Kazakh federal ministries and agencies, regional administrations, local communities, and scientific organizations. This cooperation must occur in order to prepare for and execute tiger reintroduction plans, as well as to optimize socio-economic development in the region. It is vital that the Republic of Kazakhstan’s institutes be directly involved in the programme, particularly OkhotZooProm, which is authorized to relocate animals and to provide patrol-based enforcement. Kazakhstan’s business community must also be involved in the programme, both in the interests of programme co-financing and supporting the development of local communities in the reintroduction area.

The programme to restore the Caspian tiger to Kazakhstan should be implemented in close coordination with IUCN, the Global Tiger Initiative, the UN Convention on Biodiversity Conservation, and CITES.

Partnerships with the People’s Republic of China must be strengthened in order to ensure a favourable and stable water supply in the region, particularly in achieving an agreement on an ecologically-based water apportionment plan for transboundary rivers. Attainment and monitoring implementation of such an agreement presupposes the programmatic involvement of a broad spectrum of international organizations: the UN International Commission on Irrigation and Drainage, International Secretariats on UN Conventions for the Conservation and Use of Transboundary Watercourses and International Lakes, the Convention on the Law of the Non-Navigational Uses of International Watercourses, Helsinki Rules on the Uses of the Waters of International Rivers, Geneva Convention on the Impact of Hydropower Production to Other States, and others. Moreover, there must be close cooperation with the EU-UNDP “Fostering Integrated Water Resources Management and Transboundary Dialogue in Central Asia” programme, as well as with other international projects being realized within the Republic of Kazakhstan that are thematically related to various Programme components.

The process of securing tigers specifically for reintroduction presumes an official agreement between the Republic of Kazakhstan and the Russian Federation (tentatively supported by Russian President Vladimir Putin) and the formal engagement of specialists currently conducting tiger conservation and research in the Russian Far East.

Specialists from zoos (EAZA and EARAZA) and Indian specialists highly experienced in tiger reintroduction are needed in order to provide veterinary care for animals and ensure optimal animal translocation and management (adaptation).

The need for wide-ranging discussion and future implementation of the Programme requires a working group that includes representatives of state agencies, assorted experts, and programme managers for varying aspects of the programme.

Planned programme activities are in agreement with the “Concept for the Republic of Kazakhstan’s Transition to a Green Economy”, approved by Presidential Decree on 30 May 2013 (№ 577). In particular, the proposed activities may contribute directly to completion of section 3.7: “Conservation and effective ecosystem management”.

In order to achieve programme success, support from the federal “Zhasyl Damu” programme (“Green Development”) is presumed, as well as funding from an assortment of international non-governmental and governmental organizations, both of which rely on the development of cooperation with a variety of nations and organizations. Fencing the area of future tiger releases, construction and maintenance of the visitor center of the Program can be funded by attracting additional national funding sources - partnership between the Government and national business community.
Programme Partners
*(Add/adjust during Programme working meetings and discussions!)*

Republic of Kazakhstan:
- Government of the Republic of Kazakhstan: Ministry of the Environment and Water Resources (MEWR), including the Forestry and Hunting Committee (FHC) and territorial divisions, other relevant Ministries
- Oblast (regional) and district administrations
- Relevant institutes of the Republic of Kazakhstan Ministry of Education and Science – Institute of Zoology, Institute of Geography, etc.
- Kazakh National Geographic Society
- Nazarbaev University
- OkhotZooProm (official wildlife management enterprise)
- Karachingilsky State Hunting Enterprise
- Almaty Zoo
- Kazakh NGOs
- Terra Remote-Sensing and GIS Centre
- Local communities
- Republic of Kazakhstan Protected Areas
- Business community
- International projects working in the region (complementary activities)

Russian Federation:
- WWF Russia (including the Russian Far East branch)
- Government of the Russian Federation: Ministry of Nature Conservation and other relevant government organizations
- Institutes of the Russian Academy of Science: IEE, etc.
- Russian protected areas
- Moscow Zoo/EARAZA

International partners:
- WWF (WWF Netherlands etc.)
- IUCN – SSC, Cats’ group
- EAZA
- International Commission on Irrigation and Drainage of UN,
- International Secretariats of the Convention on the Protection and Use of Transboundary Watercourses
- International donors
- Others
Programme Financial Support

This is a long-term programme and it is divided into several phases. Many of the activities are already incorporated in the Republic of Kazakhstan’s government programmes for Protected Areas development, conservation, and restoration of rare species, and regional socio-economic development. During programme discussions, it will be critical to affirm targeted use of existing programme partners’ funding, identify additional funding sources, and determine potential avenues for additional financing for programme implementation. It should be kept in mind that during the budget planning process such an innovative programme is likely to attract significant interest, both political and scientific, over a long period.

According to initial analyses, programme costs will total approximately 50 million USD during the first 10 years, of which WWF plans to raise 20 million USD. It is anticipated that the remaining funding will come from the budget of the Republic of Kazakhstan, Kazakhstan’s Nature Conservation Fund, the Kazakh National Geographic Society, and others.

Fencing the area of future tiger releases, construction and maintenance of the visitor center of the Program can be funded by attracting additional national funding sources - partnership between the Government and national business community.

Comprehensive programme development will receive indirect support from the development of environmentally sustainable alternative income sources in the region’s local communities.
List of Abbreviations

CAREC - Regional Environmental Centre for Central Asia
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora

EARAZA - Eurasian Regional Association of Zoos and Aquariums
EAZA - European Association of Zoos and Aquariums
EU - European Union
GEF - Global Environment Facility
GIS - Geographic Information System
FHC - Forestry and Hunting Committee (formerly part of the Ministry of Agriculture, currently within the MEWR)

IBA - Important Bird Area
IUCN - International Union for the Conservation of Nature
KNGS - Kazakh National Geographic Society
MA - Ministry of Agriculture
MEP-RK - Kazakh Republic Ministry of Environmental Protection, currently known as MEWR, including the FHC

MES - Ministry of Education and Science
MEWR - Ministry of the Environment and Water Resources
NGO - Non-Governmental Organization
PAs - Protected Areas
PRC - People's Republic of China
RAS-RFE - Russian Academy of Sciences-Russian Far East division
SGMNPR - State Game Management and Nature Protection Reserve
SR - Scientific Rationale
Terra RSC/GIS - Terra Remote-Sensing and GIS Centre
UNDP - United Nations Development Programme
UNEP - United Nations Environment Programme
XUAR - Xinjiang-Uyghur Autonomous Region
APPENDICES:

Appendix 1. Review, Republic of Kazakhstan Ministry of Education and Science, Institute of Geography
Appendix 2. Analytical materials, Terra Remote-Sensing and GIS Centre
Appendix 3. List of Programme land-users (prepared by Terra Remote-Sensing and GIS Centre)
Appendix 4. Legal basis for programme research, preparation, and implementation
Appendix 5. Increasing awareness, environmental education, and opportunity
Appendix 6. Measures undertaken to improve the environmental situation in the Lake Balkhash basin
Appendix 7. Potential human conflicts and local attitudes toward tiger reintroduction
Appendix 8. Potential interactions with species currently occupying the tiger’s ecological niche
Appendix 9. Veterinary programme support
Appendix 10. Establishing a Tiger Restoration Programme Visitor Centre in the Ili River delta
Appendix 11. Draft action plan for the Programme (for discussion and collaborative completion with partners upon Programme approval)
Appendix 12. Modelling of ungulate and tiger population development
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