REWILDING TBILISI NATIONAL PARK:
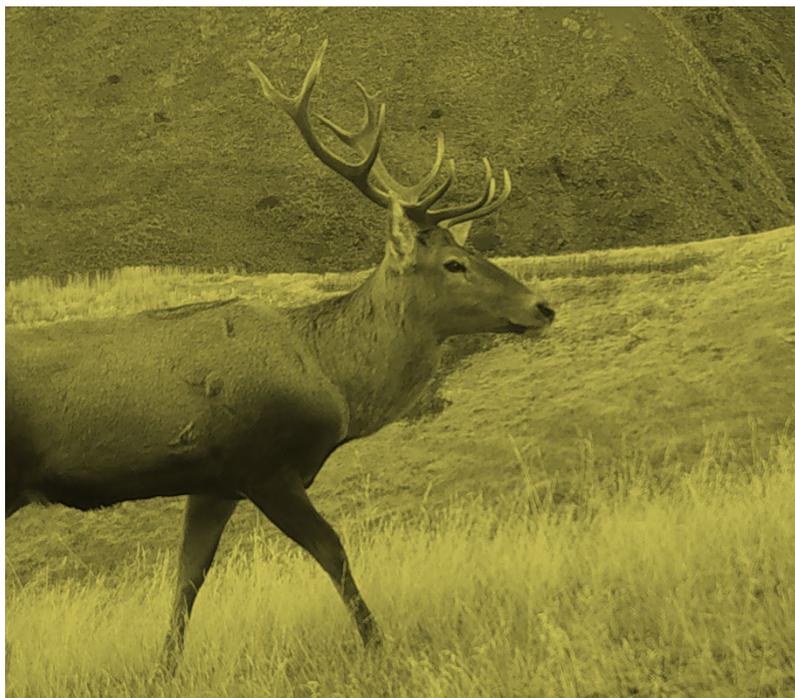
Action Plan for the Reintroduction of Red Deer

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Summary

Background and Rationale

The Caucasian red deer (*Cervus elaphus maral*) once flourished across Georgia, functioning as the country's only true forest megaherbivore and a keystone species of forest ecosystems. Over centuries, unsustainable hunting, habitat destruction, political turmoil, and weak enforcement caused populations to collapse. By the 1990s, only a few fragmented groups survived, primarily in Borjomi-Kharagauli Protected Areas (BKhPA) and Lagodekhi Protected Areas, with smaller remnants in Tusheti and Gardabani.

Although legal protections and stronger enforcement in recent decades have stabilized these populations, natural recolonization of suitable habitats—such as Tbilisi National Park (TNP)—is impossible due to habitat fragmentation and the absence of corridors. Reintroduction therefore remains the only viable strategy to restore this emblematic species to the park, strengthen ecosystem integrity, and serve as a model for broader rewilding efforts in Georgia.

Ecological and Cultural Importance

Red deer are central to both ecological processes and cultural heritage. Ecologically, they shape vegetation dynamics, maintain forest and subalpine ecosystem balance, and support predator populations. Culturally, they are deeply embedded in Georgian mythology, folklore, art, and tradition, symbolizing vitality, wilderness, and divine connection. Their return to TNP will restore ecological functionality while reconnecting people to a powerful cultural icon.

Lessons from Past Reintroductions

Georgia's earlier attempts to restore ungulates provide crucial lessons. Captive-breeding projects for goitered gazelles and bezoar goats failed due to poor facilities, limited expertise, and lack of sustained commitment. By contrast, the direct translocation ("hard release") of wild gazelles from Azerbaijan to Georgia in 2019 has been highly successful, with the population rapidly expanding. These experiences demonstrate that wild translocation is often more cost-effective, resilient, and successful than captive breeding, though mixed approaches can enhance genetic diversity.

General Approach

The TNP reintroduction strategy will prioritize translocating wild red deer from BKhPA, supplemented by limited individuals from Lagodekhi PA and captive-bred animals from Tbilisi Zoo and Algeti NP. This blended approach aims to balance cost-effectiveness, rapid establishment, and genetic diversity.

Population Viability and Source Populations

A population viability analysis (PVA) confirmed that the BKhPA herd (589–729 individuals) can safely provide 15–20 animals annually over three years without threatening its long-term viability, as it is projected to continue growing to a carrying capacity of ~1,300 individuals.

Lagodekhi's smaller herd (~147 individuals) also showed resilience in simulations, allowing limited extraction of ~5 individuals without jeopardizing survival, especially given connectivity to the larger Zakatala Reserve population in Azerbaijan. Adding a few individuals from the ongoing captive-bred program will further strengthen genetic diversity. Together, these sources ensure a robust foundation for TNP's rewilding effort.

Timeline and Phases

The project spans five years, structured into three phases:

1. **Preparatory Phase (Year 1):**
   Establish a multidisciplinary team (APA, Wildlife Agency, Tbilisi Zoo), build TNP's management and anti-poaching capacity, secure permits, procure specialized equipment, and construct a one-hectare acclimatization enclosure.
2. **Translocation Phase (Years 2–4):**
   Capture ~15 deer annually in BKhPA using safe drop-net methods. Veterinary teams will conduct health checks, attach ear tags and telemetry collars, and oversee transport to TNP. Deer will spend time in the acclimatization enclosure to recover, acclimate, and form social bonds before release.
3. **Post-Release Phase (Years 2–5):**
   Rigorous monitoring via GPS telemetry, VHF transmitters, and camera traps will track survival, adaptation, reproduction, and movement. Mortality investigations, predator monitoring, and adaptive management will inform adjustments. Anti-poaching patrols and public engagement will safeguard released populations.

Release Strategy: Hard vs. Soft

While wild-caught deer are generally suited for direct "hard release," a modified "soft release" strategy is preferred. Temporarily holding deer in an enclosure reduces capture stress, prevents immediate dispersal ("homing"), and fosters herd cohesion. This approach has proven effective in other reintroduction projects and is expected to improve survival rates. Captive-bred animals, if included, will also be integrated into these groups before joint release.

Risk Management and Threat Mitigation

Key threats include poaching, stray dogs, and potential human–wildlife conflict. Anti-poaching will be preferably strengthened through SMART patrolling, ranger training, and targeted awareness campaigns. A collaborative strategy with municipalities and NGOs will address stray dog populations through vaccination, neutering, and control measures. Veterinary surveillance will mitigate risks of disease transmission from livestock.

Monitoring predators such as wolves and jackals will be integral, ensuring a balanced ecosystem while preventing excessive predation pressure on reintroduced deer.

Public Engagement and Communication

Public support is essential for long-term success. The strategy includes awareness campaigns, school and community programs, media coverage of releases, and youth involvement in monitoring. Students and volunteers will help with camera traps, tracking, and data processing, fostering a sense of ownership. Annual festivals and regional forums will celebrate progress and strengthen community ties.

Long-Term Vision

The project envisions establishing a viable, self-sustaining red deer population in Tbilisi National Park that could eventually disperse into surrounding habitats and reconnect with other Georgian populations. Beyond red deer, the initiative will serve as a model for future rewilding projects, such as the planned reintroduction of the bezoar goat.

By combining robust science, adaptive management, and community participation, this action plan aspires not only to restore a missing keystone species but also to demonstrate how conservation can heal ecosystems and reconnect society with its natural and cultural heritage.

Contents

1 Rationale and Context for Red Deer Reintroduction

1.1 The Caucasian Red Deer: The Missing Link

The Caucasian Red Deer (*Cervus elaphus maral*) was once widespread across Georgian forests. As the country's only true forest megaherbivore, it played a pivotal role in maintaining the integrity of forest and subalpine ecosystems while also symbolizing beauty and wilderness. Yet this iconic species was not spared from decline.

The first major reductions in Georgia's red deer population coincided with political upheavals during the early 20th century and the country's occupation by the Red Army. Although the species later received full legal protection, conservation measures during the Soviet era proved insufficient. By the 1980s, the *Red Data Book of Georgia* recognized poaching and weak law enforcement outside protected areas as the main causes of the species' collapse.

After Georgia regained independence, renewed instability in the 1990s brought further devastation to wildlife. Widespread illegal hunting left red deer vulnerable even within protected areas. Only with the expansion and reorganization of Georgia's protected area (PA) system, along with stronger enforcement, has the population begun to stabilize, with growth recorded in some locations.

Today, two core populations remain: one in the Lagodekhi–Zakatala transboundary area and another in Borjomi–Kharagauli National Park, which is fully isolated. Smaller groups persist in the Gardabani Managed Reserve and Tusheti National Park. Despite a wide availability of suitable mountain forest habitat both inside and outside the PA network, natural recolonization is virtually impossible due to habitat fragmentation and the absence of functional ecological corridors. As a result, vast tracts of Georgia's wilderness remain devoid of red deer—leaving forests "empty" of their keystone herbivore. This ecological imbalance has cascading impacts, including increased human–wildlife conflict, particularly with large carnivores whose prey base has been diminished.

1.2 Why Rewild Tbilisi National Park?

Historically, red deer persisted in the Saguramo Nature Reserve (now part of Tbilisi National Park) until the late 1980s. However, the reserve's limited size of just 4,000 ha proved inadequate to sustain an isolated population in the long term. In 2007, the reserve was expanded and upgraded to national park status, now covering nearly 21,000 ha.

Despite its ecological richness, Tbilisi National Park (TNP) still lacks one of its key species—the red deer. Natural recolonization is highly improbable, given the park's isolation from core populations by distance, urban development, and major infrastructure. Restoring a viable red deer population—thereby rewilding the ecosystem with one of its critical components—would help re-establish the ecological integrity of this otherwise well-preserved forest. Moreover, the park's strategic geographical position within both national and regional red deer ranges makes it one of the highest-priority sites for reintroduction.

Until recently, however, the feasibility of such a restoration remained uncertain due to insufficient scientific evidence. The development of this Action Plan has been made possible through comprehensive studies that assessed ecological and socio-economic conditions, habitat suitability, and management capacity. These findings now provide a solid foundation for rewilding TNP's ecosystem through the return of the red deer.

1.3   Tbilisi National Park in the Context of National Rewilding

The rewilding of Tbilisi National Park through the restoration of a red deer population is designed to complement the recently launched reintroduction program in Algeti National Park, located approximately 60 km west of Tbilisi. From a national and regional metapopulation perspective, the two initiatives are mutually reinforcing: if successful, they will establish the foundation for natural expansion and recolonization in several key directions, particularly westward and northward into extensive areas of suitable habitat.

The two sites are pursuing different, yet complementary, reintroduction strategies. In Algeti, captive-bred individuals are being released into a large enclosure, where they will adapt and breed before being gradually released into the wild. In contrast, Tbilisi National Park will apply a different approach, translocating wild-caught individuals from viable populations directly into the park. Both methods carry advantages and limitations, but together they provide unique opportunities for synergy. In particular, the possibility of exchanging animals between sites could significantly enhance genetic diversity and long-term viability. For example, introducing a small number of wild-caught deer into the Algeti population would increase genetic variability, while captive-bred individuals from Algeti could be integrated into the Tbilisi rewilding effort alongside wild-caught deer.

Beyond red deer, Georgia's forests and mountain landscapes are missing other keystone species whose natural recolonization is improbable. Large areas of rocky, forested mountain habitat remain suitable for the reintroduction of the Bezoar goat, for which national plans already exist. The experience gained through rewilding Tbilisi National Park will not only strengthen the country's capacity to restore red deer but will also provide valuable knowledge and expertise for these broader species restoration initiatives.

In this way, Tbilisi National Park has the potential to serve as a model site for rewilding in Georgia, demonstrating how science-based species restoration can revive ecosystems and guide future conservation strategies.

1.4   Long-Term Vision

The project envisions establishing a viable, self-sustaining red deer population in Tbilisi National Park that could eventually disperse into surrounding habitats and reconnect with other Georgian populations.

By combining robust science, adaptive management, and community participation, this action plan aspires not only to restore a missing keystone species but also to demonstrate how conservation can heal ecosystems and reconnect society with its natural and cultural heritage.

1.5 Development of the Red Deer Reintroduction Action Plan

Although the overall condition of forest habitats was already known and considered favourable for red deer reintroduction, significant gaps remained in other critical areas of knowledge. Key scientific data were lacking to fully assess the feasibility of restoration and to plan the process in detail. For this reason, a comprehensive feasibility phase was undertaken, encompassing a series of targeted surveys and studies. These included:

- An ecological assessment of Tbilisi National Park and a habitat suitability analysis.
- Socio-economic and veterinary assessments of the surrounding areas.
- A capacity needs assessment of the TNP Administration.
- An evaluation of potential source populations within Georgia, with a focus on identifying stock for translocation.

The results of these studies provided the foundation for the development of a detailed reintroduction strategy and a set of concrete actions designed to ensure not only a smooth and successful reintroduction, but also the long-term survival of the new red deer population.

To carry out these studies and to elaborate the overall strategy, a professional team was assembled that included leading national specialists, supported by internationally recognized experts in deer conservation and ungulate restoration.

At the same time, the project team maintained regular communication with relevant governmental agencies and ensured close coordination with the main beneficiary—the Agency of Protected Areas—as well as with the Administration of Tbilisi National Park and other key stakeholders.

2   Biology of the Red Deer

2.1   Taxonomy and Classification

The red deer (*Cervus elaphus*) was once regarded as a single species with a broad distribution across the Northern Hemisphere, encompassing populations in Europe, Asia, and North America. However, subsequent genetic, morphological, and ethological studies have led to a taxonomic revision (Lovari et al., 2018). As a result, the East Asian forms, along with North American populations, have been elevated to full species status: the wapiti or elk (*Cervus canadensis*) (Pitra et al., 2004; Groves & Grubb, 2011; Lovari et al., 2018; Mattioli. et al. 2022). The name *Red Deer* (*Cervus elaphus*) is now restricted to populations across the remainder of the Old World range.

Ten subspecies of *Cervus elaphus* are currently recognized within the western portion of the range, according to the most recent IUCN Red List assessment (Mattioli, et al. 2022):

Subspecies	Geographic Range
Cervus elaphus elaphus	Southern and central Sweden
Cervus elaphus atlanticus	Norway
Cervus elaphus scoticus	Great Britain; introduced into Ireland in ancient times
Cervus elaphus hispanicus	Spain; reintroduced into Portugal
Cervus elaphus hippelaphus	Western and central continental Europe, from France to Czechia and Poland; introduced into western Russia
Cervus elaphus pannoniensis (syn. *carpathicus*)	Carpathian Mountains, Pannonian lowland, Balkan Peninsula
Cervus elaphus italicus	Italy (Mesola Wood, near Ferrara)
Cervus elaphus corsicanus	Corsica (extinct in the wild, reintroduced from Sardinia in 1985) and Sardinia
Cervus elaphus barbarus	Atlas Mountains in Algeria and Tunisia; reintroduced in Morocco
Cervus elaphus maral	Caucasus region, Anatolia, and northwestern Iran

The Georgian red deer belongs to the Caspian red deer (*Cervus elaphus maral* Ogilby, 1840), one of the largest subspecies, whose range also includes Turkey, Russia, Azerbaijan, and Iran. In the past, the Caspian red deer also inhabited Armenia, but the population was exterminated in the early 20th century (Markov, 1934).

2.2   Morphology and Physical Characteristics

The Caspian red deer (*Cervus elaphus maral*) stag is typically 180–230 cm long from the nose to the base of the tail, with a shoulder height of 120–150 cm (Janashvili, 1977), and generally weighs 200–300 kg (Markov, 1934; Ekvtimishvili, 1946; Janashvili, 1963; Arabuli, 1985; Kokhodze, 1991). Dinnik (1910) reported individuals from the northern Caucasus reaching 155 cm at the shoulder and weighing up to 325 kg. The hind is smaller, 160–210 cm in length, and often weighs 140–180 kg (Markov, 1934;

Janashvili, 1950, 1963). The tail measures 12–19 cm (Macdonald & Barrett, 1993; Janashvili, 1950). Body mass typically depends on population density and habitat quality (Macdonald & Barrett, 1993).

The coat of the Caspian red deer is dark grey in winter and dark brown to reddish in summer, with clearly visible spots (Dinnik, 1910; Arabuli, 1977). Males develop a darker mane on the neck during the rutting season. The head is more elongated and slender compared to other subspecies (Dinnik, 1910; Ekvtimishvili, 1946; Janashvili, 1977). Calves are born with a brown coat covered in white–yellowish spots, which usually disappear upon reaching maturity (Janashvili et al., 1984; Macdonald & Barrett, 1993).

Antlers are relatively simple in shape, with fewer tines compared to European red deer (Dinnik, 1910, 1914; Markov, 1938). In Georgia, antlers typically bear 10–16 tines (Arabuli, 1977, 1985), with a maximum of 18 recorded in Borjomi (Arabuli, 1980). Other authors have reported that antlers rarely exceed 10 tines (Kukhianidze, 1965). Historical accounts describe exceptionally large antlers: one specimen had 20–22 tines (Radde, 1899), and another 24 (Dinnik, 1910). However, tine number is a poor indicator of age, as stags older than 10 years may lose points (Janashvili, 1977; Janashvili et al., 1984; Arabuli, 1985; Macdonald & Barrett, 1993). Antler asymmetry is also common (Janashvili, 1977). Antlers are shed mainly in March, with regrowth beginning immediately thereafter (Janashvili, 1977).

The impressive size and form of red deer antlers have always fascinated humans, particularly hunters, likely due to the strong symbolic and archetypal associations they carry (see subchapter 2.1).

2.3   Habitat

Red deer occupy a wide range of habitats (Macdonald & Barrett, 1993), but Caspian red deer generally prefer forested mountain landscapes with small openings and numerous streams (Janashvili, 1950, 1977; Ekvtimishvili, 1946; Arabuli, 1980, 1985).

In the Caucasus, red deer range up to 3000 m a.s.l. (Arabuli, 1985) and in some areas up to 3100 m (Janashvili, 1977). They typically occur between 1000–2300 m (Arabuli, 1977), with a preference for 1100–1800 m (Ekvtimishvili, 1946). The same elevational preferences have been observed in Lagodekhi Protected Areas (NACRES report, 2021). Seasonal migrations occur: in Kvareli, for instance, red deer winter on southern slopes and move northward to the Greater Caucasus ridge in summer (Kokhia et al., 1973).

During summer, red deer may reach alpine meadows and sometimes overlap with East Caucasian tur habitat in Lagodekhi Reserve. They exhibit vertical migration: occupying subalpine zones in summer and descending to lower elevations in winter. Historically, they also migrated to lowlands in winter and returned to mountains in summer (Radde, 1899). However, by the mid-20th century, heavy land use in the Caucasus fragmented lowland habitats, making such migrations impossible (Vereshchagin, 1959). Today, movement is restricted by agriculture, infrastructure, and settlements.

2.4   Reproductive Biology and General Habits

Reproduction in red deer is highly seasonal. The rut begins in mid-September and continues until early November (Janashvili, 1977; Macdonald & Barrett, 1993). Some authors suggest the rut can

start as early as late August and extend until February (Janashvili, 1977), but such prolonged periods have not been confirmed by other authors.

Gestation lasts 230–240 days, with calving occurring in late May to early June (Macdonald & Barrett, 1993). Twins are very rare (Janashvili, 1977). Females reach sexual maturity at 16–18 months, males at 2–3 years, though young males often do not breed until older due to competition (Macdonald & Barrett, 1993).

In the wild, red deer typically live 13–15 years, though in captivity individuals may reach 25 years (Janashvili, 1977; Macdonald & Barrett, 1993).

Social organization is based on small groups: hinds form matrilineal groups with their offspring. Some authors describe groups of 10–15 individuals (Janashvili et al., 1984), while others report smaller groups of 4–6 in winter and 2–4 in summer (Arabuli, 1977)[1]. Stags are often solitary or form bachelor groups outside the breeding season (Macdonald & Barrett, 1993).

Feeding occurs in forest clearings or subalpine meadows. Activity is predominantly crepuscular, with peaks at dawn and dusk, except during the rut when males may remain active throughout the day if undisturbed.

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[1] This aligns well with the red deer surveys conducted by NACRES in 2024 as part of the feasibility assessment for this Action Plan.

3 Red Deer in Georgia

The history of the red deer (*Cervus elaphus maral*) in Georgia reflects the broader story of environmental change in the Caucasus. Once widespread and a keystone species of Georgian forests, the red deer has suffered dramatic population declines, leaving only several fragmented and isolated populations in the country today. This chapter reviews available literature to reconstruct the species' population dynamics, evaluate its current status, and examine the threats that continue to hinder its survival and recovery. Understanding this complex picture—shaped by historical, cultural, ecological, and socio-political factors—is essential for designing and implementing effective strategies to restore this iconic animal to its former range, including areas near the capital, such as Tbilisi National Park.

3.1 The Red Deer in Georgian Culture

The red deer holds a special place in Georgian mythology and culture, appearing in myths, folklore, art, and literature.

In traditional beliefs, the deer is closely associated with the divine, often embodying the spirit of the forest and the renewal of nature. Antlered stags are sometimes depicted as messengers between earthly and spiritual realms, with folktales describing heroes using antlers to reach the sun. The goddess Dali—protector of hoofed mountain animals, including deer—was central to hunting traditions. Hunters sought her favour and respected strict taboos to ensure success, underscoring the sacred status of deer. In regions such as Khevsureti and Tusheti, red deer antlers were dedicated to shrines (Radde, 1899; Dinnik, 1910; Vereshchagin, 1959) many of which still preserve these offerings today.

The red deer also plays a prominent role in Georgian mythology and historical narratives. In some versions of the *Epos of Amirani*, the hero and his brothers encounter a stag with golden antlers, symbolizing a moment of great significance. According to *Kartlis Tskhovreba* (*The History of Georgia*), King Parnavaz, while hunting in the floodplains near the village of Digomi (now part of modern Tbilisi), wounded a deer and subsequently discovered a hidden treasure. This treasure enabled him to organize a rebellion against foreign invaders and ultimately establish the first Kartvelian (Georgian) kingdom. Folklore also recounts that the legendary Georgian hero Irmisa—whose name translates as "of deer"—was nursed by a hind (Kokhodze, 1991).

Georgian Christian tradition also preserves this symbolic connection. According to hagiographic accounts, St. David Garejeli (6th century) and his fellow monks were repeatedly visited by three deer at the monastery they had founded in the remote, uninhabited landscapes of southeastern Georgia. These deer provided vital sustenance, as the monks milked them and made cheese, enabling them to survive in the otherwise barren environment.

Photo 1. Headdress decoration — open-work clip. Gold. Third quarter of the 4th century BC, Georgian National Museum / Fernando Javier Urquijo

Photo 2. Grape vine – Tree of Life, a detail of bas-relief at Ananuri XVI-XVIII ს., (source: Sakdrisi Committee)

Symbolically, the deer represents ascent, light, and purity. Its branching antlers symbolise sunrays, embodying renewal, fertility, and eternity. This symbolism links directly to the *Borjgali*—Georgia's ancient solar emblem and tree of life motif. Deer also appears in Caucasian "Tree of Life" designs, reinforcing their cosmological importance.

In art and material culture, the deer is a recurring motif. A golden sculpture of a stag's head, dating to the first century AD, was unearthed near the Inguri River (Kokhodze, 1991). Deer are frequently depicted on gravestones and sacred sites, often in hunting scenes. In modern times, the renowned Georgian painter Niko Pirosmanashvili's red deer image appears on the 20 tetri coin, paired with the *Borjgali*. In literature, Vazha-Pshavela and other great Georgian authors celebrated the deer as a symbol of vitality, beauty, and the spirit of the forest.

Thus, the red deer is deeply embedded in Georgia's cultural and spiritual identity, representing purity, vitality, and connection to both the natural and divine realms.

3.2   Historical Distribution

3.2.1   *Early Accounts and Evidence of Abundance (Late 18th - Early 19th Century)*

Anecdotal and observational records indicate that red deer were widespread across Georgia at the close of the 18th century. Johann Anton Güldenstädt, a naturalist and explorer, noted during his travels in the Caucasus (1768–1775, published 1791) that red deer skulls adorned with antlers were commonly displayed in Kakhetian villages. He interpreted this practice as evidence of the species' abundance and cultural prominence in the region (Güldenstädt, 1791).

Further substantiating these accounts, Prince Vakhushti Batonishvili/Bagrationi (1892), in his geographical works describing Georgia in the late 18th century, reported the presence of red deer across the central parts of the country. He highlighted the particularly high numbers inhabiting the extensive riparian forests along the Mtkvari (Kura) River on the Karayazi Plain (extending across

present-day Georgia and Azerbaijan). These areas were renowned as favoured hunting grounds for Georgian royalty. Prince Vakhushti also noted that red deer were plentiful in the forests of the Lesser Caucasus, especially in the Debeda River gorge and its surrounding landscapes.

As compelling evidence, he also cited the historical notes by Sekhnia Chkheidze, which chronicled the hunting expeditions of his father King Vakhtang VI (1716–1724). These accounts describe hunts near Shambiani Mountain in central-southern Georgia, where as many as 60 red deer were reportedly killed on the first day of an expedition, followed by 160 more during a subsequent driven hunt (Vakhushti Batonishvili, 1892). Even if somewhat embellished, such figures strongly suggest a once-thriving red deer population in Georgia.

3.2.2   Declining Populations at the End of the 19th Century

By the latter half of the 19th century, although red deer were still found in several regions of the Caucasus, signs of significant population decline were evident. Gustav Radde, a prominent naturalist who studied the region extensively, provided valuable records in his works (Radde, 1899). He reported that red deer had already disappeared from the high-altitude landscapes of Upper Svaneti (western Georgia) by 1864, attributing their loss mainly to severe winter conditions. Radde also described seasonal migrations, noting that red deer and roe deer moved to the lowlands near the Black Sea coast in Guria during winter—behaviour that increased their vulnerability to hunting by local communities.

Radde further documented that widespread deforestation had eradicated red deer from the Rioni River delta near the port city of Poti by 1872. Nevertheless, the species continued to survive in the forested regions of western Georgia, namely in Abkhazia and Mingrelia, with a particularly strong refuge in the Borjomi Gorge in central Georgia. There, the establishment of a royal hunting reserve provided a degree of protection that allowed the population to persist. In Khevsureti, red deer antlers were offered in sacrifice at small mountain shrines, suggesting the animals remained available in these remote highland areas. Radde additionally recorded red deer in the valleys of the Koisu rivers (possibly the Andi Koisu, Avar Koisu, and other tributaries of the northern Greater Caucasus, some of which rise in Tusheti, Georgia) and in the Tliarata region (Dagestan, Russia), indicating shared or transboundary populations (Radde, 1899).

A more sobering assessment was provided by Nikolay Dinnik (1910). He noted that by the end of the 19th century, heavy hunting pressure had driven red deer populations into sharp decline across much of the Caucasus, confining them to remote and inaccessible mountain forests where they survived at low densities. Borjomi again stood out as a notable exception, largely because of its protected status. Dinnik emphasized that the high market value of antlers fuelled this unsustainable hunting, especially of stags during the rutting season. He likened the hunters' obsession with large antlers to the "curse of ivory" for elephants, underscoring the destructive trophy demand.

Confirming Radde's observations, Dinnik reported that red deer were no longer present in Upper Svaneti or the Rioni delta. However, he noted their persistence in the lower Enguri River basin and mentioned small numbers near Batumi, with a stronger population further south near Borçka (in present-day Turkey). He also recorded red deer north of Tbilisi, in the forests around Ananuri and

Pasanauri, as well as in the lowland riparian forests of the Mtkvari, Alazani, and Iori rivers (Dinnik, 1910).

3.2.3   Red Deer Population in the Early to Mid-20th Century

The dawn of the 20th century offered no relief for the red deer in Georgia, as their populations continued to shrink and fragment. The significant political and economic turmoil of the era, including the First World War and the establishment of the Soviet regime, had a drastic impact on game animals throughout the Caucasus. Between 1918 and 1920, these changes led to a weakening of protection for key red deer populations in areas such as Borjomi and Lagodekhi, fuelling uncontrolled hunting and a noticeable population decline (Markov, 1938). Although a hunting ban was enacted in 1921 (Evktimishvili, 1946), it proved ineffective in halting the decline; in neighbouring Armenia, the last red deer was killed in 1922 (Fadeev, 1982).

Lagodekhi Reserve: Monitoring in the newly established Lagodekhi Reserve began in the 1930s. Initial counts by E. Markov found only 10-20 individuals (Markov, 1938). However, the population showed signs of recovery in the following years. Janashvili (1950) counted 60-90 red deer in the autumn of 1942, and Ekvtimishvili (1946) recorded 91 individuals by 1944.

Borjomi Reserve: The Borjomi population, a key remnant on the Lesser Caucasus, had dwindled to just 100-200 individuals by the start of the 20th century (Markov, 1934). It saw a slight increase to 200-250 individuals in the following years (Markov, 1937). Ekvtimishvili (1946) reported a low of 78 individuals in 1934, but noted a subsequent increasing trend, with the population reaching a remarkable 1,401 individuals by 1943.

According to Ekvtimishvili (1946), red deer remained in five main locations, mostly of them in eastern Georgia. These included the Ritsa and Borjomi Reserves, the Aragvi River basin, the Kvareli-Lagodekhi area with its groups in the Alazani riparian forest, and the Gardabani Hunting Reserve. This author also noted that fresh antlers were found near Betania, close to Tbilisi, suggesting a wider presence than officially recorded.

Archil Janashvili (1950) described a similar, though slightly wider, distribution. He confirmed that while the species' range had significantly contracted, red deer were still found in many of Georgia's forested areas. Janashvili indicate the species in the high mountain forests of Abkhazia, with the highest numbers in the Ritsa Reserve, and noted remnant populations in the Lower Svaneti and Lechkhumi districts. He also confirmed their continued presence in the Aragvi and Ksani river basins and in the Chiauri riparian forest along the Alazani River. Near Tbilisi, deer were present in the Saguramo Reserve, with some individuals dispersing towards Ialno Mountain and the Tsiv-Gombori Range. Furthermore, he documented sightings near Tetritskaro and on the right bank of the Mtkvari River outside the Borjomi Reserve (forested area near Aspindza). He also noted that the range extended towards Adigeni on Meskheti ridge.

In a later publication, Janashvili (1977) documented a surprising encounter from the 1920s, when locals killed a deer near Ozurgeti in the Guria region. The locals' surprise suggested the animal was a rare disperser, likely a young deer from the Meskheti ridge or possibly the Lower Svaneti-Lechkhumi area.

Vereshchagin (1959) provided another perspective, noting a few key spots of red deer distribution. According to his data, a few individuals likely remained in the middle reaches of the Enguri River, while populations persisted in the Borjomi region and along the Adjara-Imereti mountain range. He also found them along the eastern part of the Greater Caucasus Range, with notable numbers in the Zakatala region of Azerbaijan, which borders Georgia's Lagodekhi Protected Area. A map from this period also indicated a small group clinging to existence in the riparian forests of the Mtkvari River near Gardabani.

However, Vereshchagin's account notably missed the populations in the Ritsa Reserve and the Aragvi and Ksani river basins, which were confirmed multiple times by Georgian scientists. Therefore, the range maps reconstructed from the more detailed local data provided by Georgian researchers are considered more accurate. The historical map (Map 1) was created by outlining the forested areas near documented settlements, based on the fact that the forest cover remained largely unchanged since the 1950s.
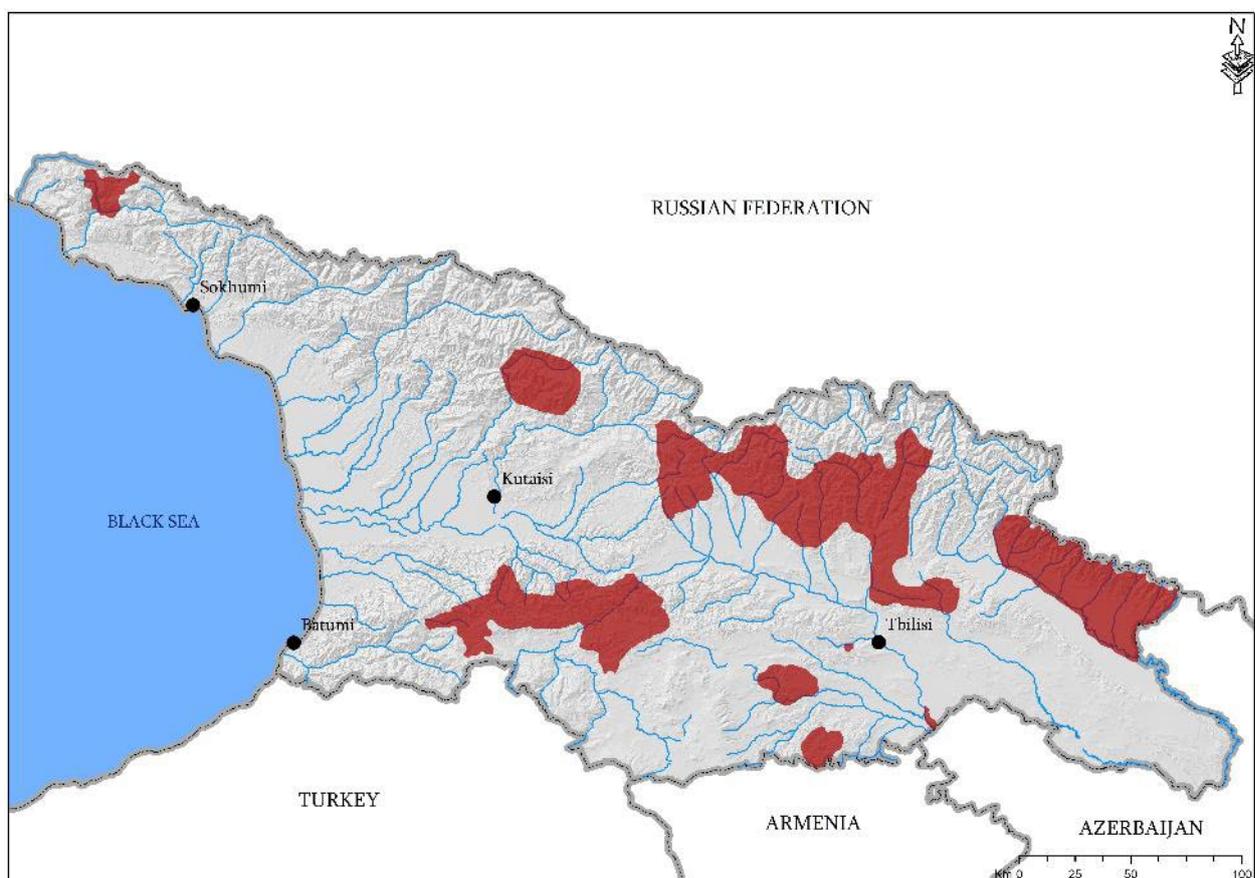
Map 1 Red deer distribution in the mid-20th century (shown in red), reconstructed from data by Ekvtimishvili (1946) and Janashvili (1950).

3.2.4   Mid to Late 20th Century

From the mid- to late 20th century, red deer in Georgia survived only as several fragmented populations. According to Aleksandre Arabuli (1977), who conducted extensive research in the Lesser Caucasus, the species was confined to the Meskheti Range within the Borjomi Reserve. This protected

area supported a relatively high number of red deer, and from this core population, animals occasionally dispersed into surrounding districts such as Adigeni, Akhaltsikhe, Aspindza, Kharagauli (formerly Orjonikidze), and Baghdati (formerly Maiakovski). Other studies confirmed the same distribution pattern in the Lesser Caucasus (Gambarashvili & Burdjanadze, 1966; Arabuli, 1977, 1985; Kacharava et al., 1982).

The second-largest population occurred in Kakheti, within the forested areas of Lagodekhi and Kvareli, where the range extended into the Zakatala Reserve in Azerbaijan (Gambarashvili & Burdjanadze, 1966; Kokhia et al., 1973; Arabuli, 1977, 1985; Kacharava et al., 1982). By this time, however, red deer had disappeared from the Chiauri riparian forest along the Alazani River (Arabuli, 1977; Janashvili et al., 1984; Kacharava et al., 1982). Small and scattered populations were reported from the Gardabani district and from the valleys of the Aragvi and Ksani rivers (Arabuli, 1974; Janashvili, 1977; Kacharava et al., 1982). In western Georgia, the species' distribution had contracted dramatically, persisting only in the Ritsa Reserve, in the Abkhazia Autonomous Republic (Janashvili, 1977; Kokhodze, 1991).

Reliable data on population size during this period are scarce. Most information comes from protected areas. The *Bunebis Matiane* (Chronicles of Nature) of the Borjomi Reserve reported 1,150 individuals in 1961 (when the reserve covered only 18,000 ha), though some experts considered this a gross overestimate (Kukhianidze, 1965). Arabuli's (1977) independent counts in 1974–1975 recorded only 371 red deer in Borjomi and the adjacent Akhaltsikhe and Adigeni areas. By contrast, the *Bunebis Matiane* claimed as many as 1,420 animals in Borjomi alone for the same years. Arabuli (1980) concluded that staff of the Borjomi Reserve systematically exaggerated population estimates. By the late 1980s, the Borjomi population was more conservatively estimated at around 500 individuals (Chikovani et al., 1990).

In Lagodekhi, the population initially remained small in the 1930s but showed steady growth. A 1941 survey by the Institute of Zoology of the Georgian SSR Academy of Sciences counted 91 deer in the reserve (Enukidze, 1953). By 1961, numbers had risen to 480. However, during the next three years, livestock grazing within the reserve and intensive geological exploration caused a sharp decline to 384 individuals (Petriashvili, 1969). Following the restoration of strict protection—and in a context of predator control—the population rebounded, reaching 1,434 individuals by 1990 (Gurielidze et al., 2000).

Arabuli (1974) observed that red deer numbers outside protected areas had become so depleted that meaningful population surveys were no longer feasible. In recognition of their precarious situation, the species was listed in the Red Data Book of Georgia, and hunting was officially prohibited (Kacharava et al., 1982).

Nevertheless, populations remained fragmented and largely confined to protected areas. By the late 20th century, red deer were restricted to Borjomi, Lagodekhi, Ritsa, Saguramo (Kacharava et al., 1982; Arabuli, 1985), and Liakhvi reserves (Chikovani et al., 1990). A small group survived in the Gardabani State Hunting Reserve—the last remnant of the once extensive riparian forest population (Kacharava et al., 1982). A few individuals dispersed into nearby areas from Borjomi and Lagodekhi, while small groups still inhabited the upper reaches of the Ksani, Aragvi, and Iori rivers (Kacharava et al., 1982; Arabuli, 1985).

3.2.5   The Crisis of the 1990s and the first decades of the 21 century

The political instability and economic collapse following the dissolution of the Soviet Union in the early 1990s had a devastating impact on Georgia's wildlife. Civil unrest rendered environmental protection virtually impossible. Military firearms became widely available, and weakened protection in reserves fuelled extensive illegal hunting. People entered protected areas freely, killing large numbers of game animals without fear of consequences. As a result, populations of all ungulates, and especially red deer, declined sharply (Badridze et al., 2000).

Arabuli (2002) confirmed this drastic decline, attributing it not only to pervasive poaching but also to an increase in wolf numbers, which, in his opinion, added further pressure on already depleted ungulate populations. By the mid-1990s, red deer had disappeared from the Saguramo Reserve—the only population on the Tsiv-Gombori Range—and their presence in western Georgia had become uncertain. Populations in the Liakhvi Reserve were also questionable (Country Study, 1996). The largest surviving population was in Lagodekhi, while deer numbers in Borjomi, Tusheti, and Gardabani remained extremely low (Country Study, 1996; NACRES database, 2003). Interestingly, during this period, literature again mentioned the Tusheti population, which had not been reported since Radde's 19th-century reference to the Koysu population.

Independent surveys conducted by NACRES in the two major populations confirmed the severity of the crisis. In Lagodekhi, numbers fell from about 1,443 individuals to only 80 in 1997 (Gurielidze et al., 2000). In Borjomi, just 30 individuals were recorded in 1999 (Bejan Lortkipanidze, unpublished data). Official Protected Area (PA) statistics were broadly consistent, reporting 39 red deer in Borjomi in 1999 (BKhAP report, 2024). A third small population persisted in the Gardabani Managed Reserve (Mtkvari River riparian forest near the Azerbaijan border), with estimates ranging from 15–20 (Arid and Semiarid Ecosystem MP, 2003) to 30–40 individuals (Arabuli, 2002).

Despite decades of nominal protection, by the turn of the 21st century red deer populations in Georgia remained critically small and highly fragmented. With the gradual stabilization of the country, significant reforms were introduced in the protected area system. National reserves were expanded, protection categories revised, and large national parks were established. Backed by international support, local and global conservation organizations strengthened environmental law enforcement and enhanced protection of these new parks. Biodiversity monitoring became a national priority, supported by more advanced techniques for assessing species numbers and distributions. In 2006, the first official Red List of Georgia was published, with red deer listed as *Critically Endangered* (Resolution №190 of the Government of Georgia, 2014). These reforms—combined with stronger protected areas and better enforcement—had a positive effect on red deer recovery, alongside other large mammals.
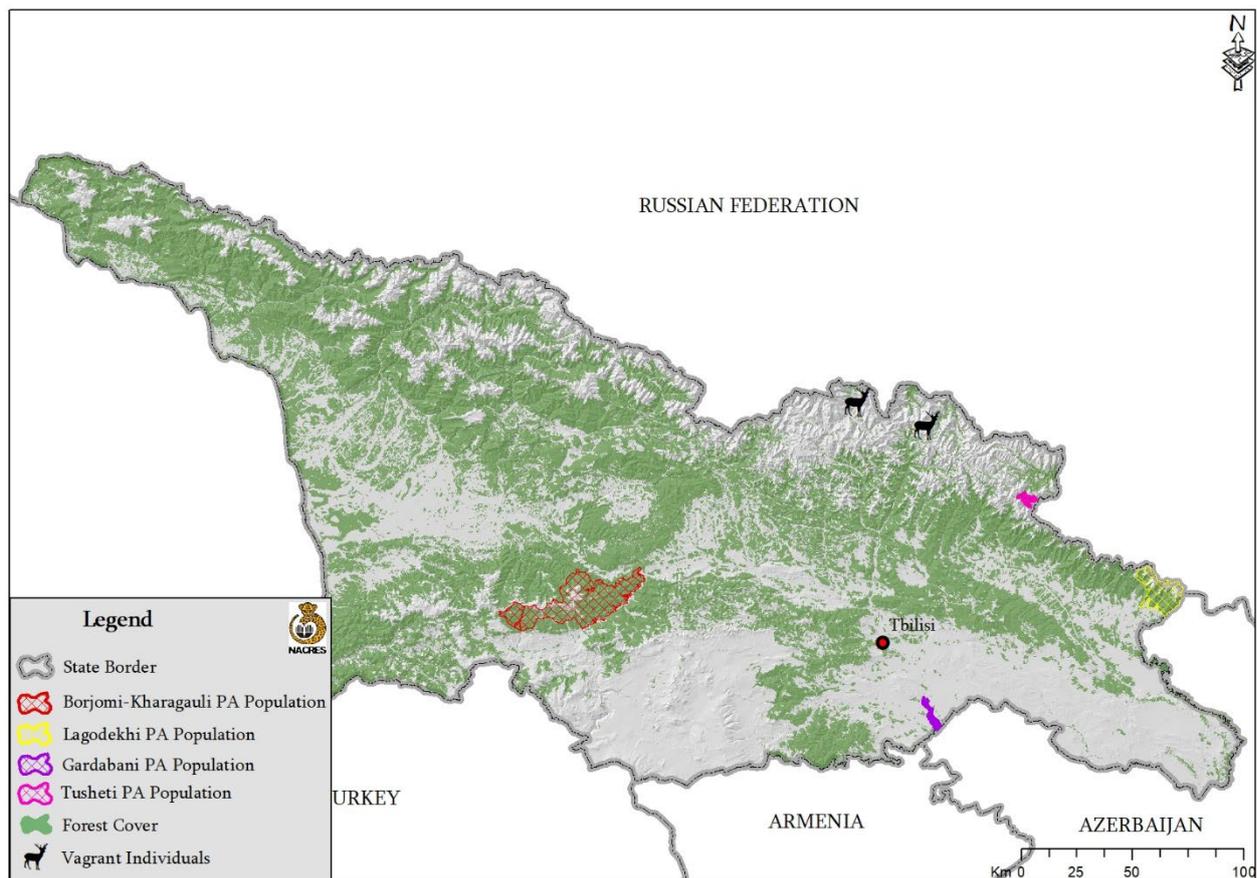
Map. 2. Current distribution of Red deer in Georgia

As a result, by the early 21st century, there were two viable red deer populations: Borjomi and Lagodekhi. Populations in Gardabani and Tusheti showed little, if any, recovery. Gardabani's population remained extremely isolated, with the reserve too small to support significant growth. Tusheti's population, connected to Dagestan (Russia), continued to face heavy hunting pressure and persisted at very low numbers (Map 2).

Occasional records of red deer also emerged from other areas, though these likely represented vagrant individuals rather than stable populations:

- **Kazbegi National Park**: a female was photographed by Giorgi Darchiashvili during a birdwatching tour in 2017 and by Kazbegi park ranger Giorgi Chkareuli in 2025.
- **Pshav-Khevsureti Protected Areas**: a NACRES camera trap recorded a young stag near Khakhabo in 2012. No further sightings, despite frequent visits by researchers and birdwatchers, suggest these were transient individuals from Russia.

Assessment of red deer populations became regular by protected area staff, and these results were included in their annual publications. Red deer populations were also independently assessed by Universities and NGOs, providing valuable data on the status and dynamics of the modern red deer population.

3.3   Dynamics and Status of Key Red Deer Populations

Ilia State University (ISU) and NACRES have carried out several assessments of red deer populations in Lagodekhi and Borjomi-Kharagauli Protected Areas (BKhPA) between 2012 and 2024. The most recent surveys were conducted in spring and autumn 2024 by the NACRES team within the *Rewilding Tbilisi National Park Ecosystem (RTNP)* project. These assessments provide valuable insights into the status of Georgia's largest red deer populations. Protected area administrations also implement their own monitoring programs, conducting annual counts during the rutting season by recording roaring stags. Results are published in their official reports.

3.3.1   Borjomi-Kharagauli Population

According to BKhPA administration data, red deer numbers show a sharp increase (BKhPA Report, 2024). However, independent surveys by ISU and NACRES—based on indirect methods such as pellet group counts and roaring stag counts—indicate a slower recovery (Ilia State University 2012, 2013 and NACRES report, 2016, 2021). While the overall trend is positive, their estimates suggest more modest population growth than official figures (Figure 1). The most recent independent assessment by NACRES in autumn 2024, during the rutting season, estimated 589–729 individuals in BKhPA (mean value shown in Figure 1).
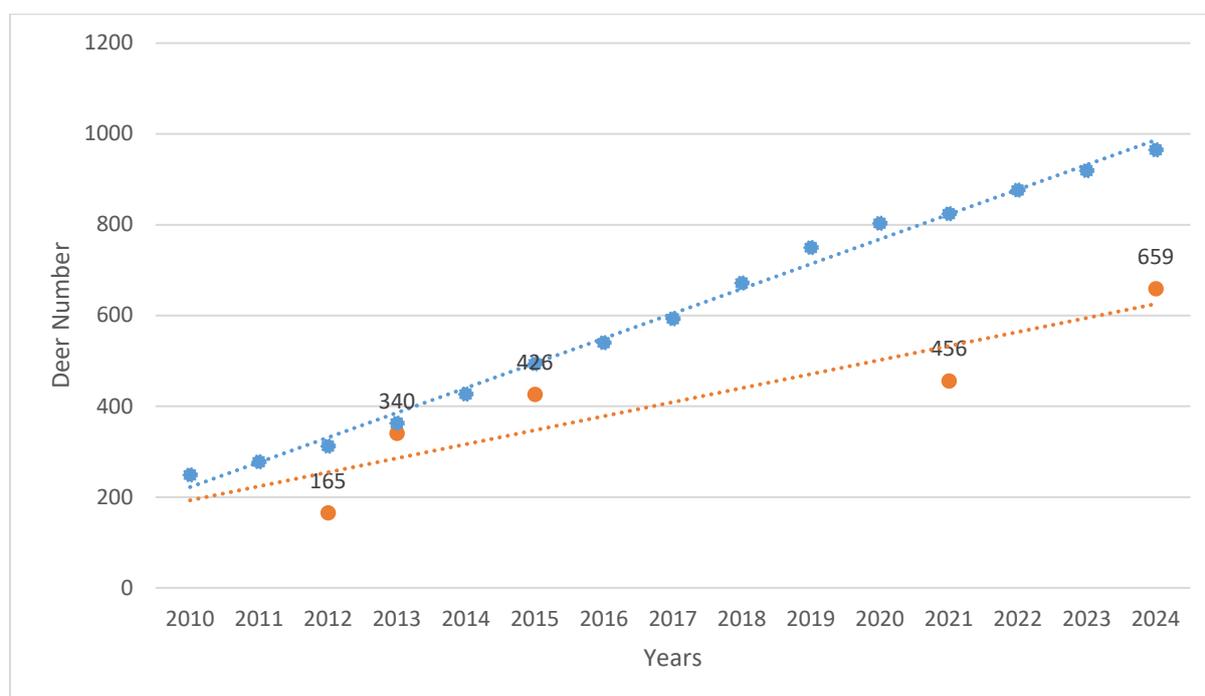
Fig. 1. *Red deer population trend in Borjomi-Kharagauli Protected Area (BKHPA) during the last 14 years. Blue dots represent official data; orange dots represent Ilia State University and NACRES assessment results. Dotted lines indicate trends based on respective datasets.*

3.3.2   Lagodekhi PA population

In Lagodekhi PA, NACRES conducted its most recent assessment in spring 2024 using the pellet group count method (Mayle et al., 1999). The results indicated an estimated 147 individuals (95% CI: 73–

175). The population here has fluctuated considerably over the past 14 years. Although this estimate was higher than in the previous NACRES survey (NACRES report, 2019), the long-term trend remains negative, contradicting official reports. The reasons for these fluctuations remain unclear. It is hypothesized that population dynamics in Lagodekhi are influenced by the neighbouring Zakatala Reserve (Azerbaijan), levels of illegal hunting, disturbance from tourism, and possibly climate change and interspecific interactions with mountain ungulates. Further monitoring is needed to test this hypothesis and clarify long-term trends.
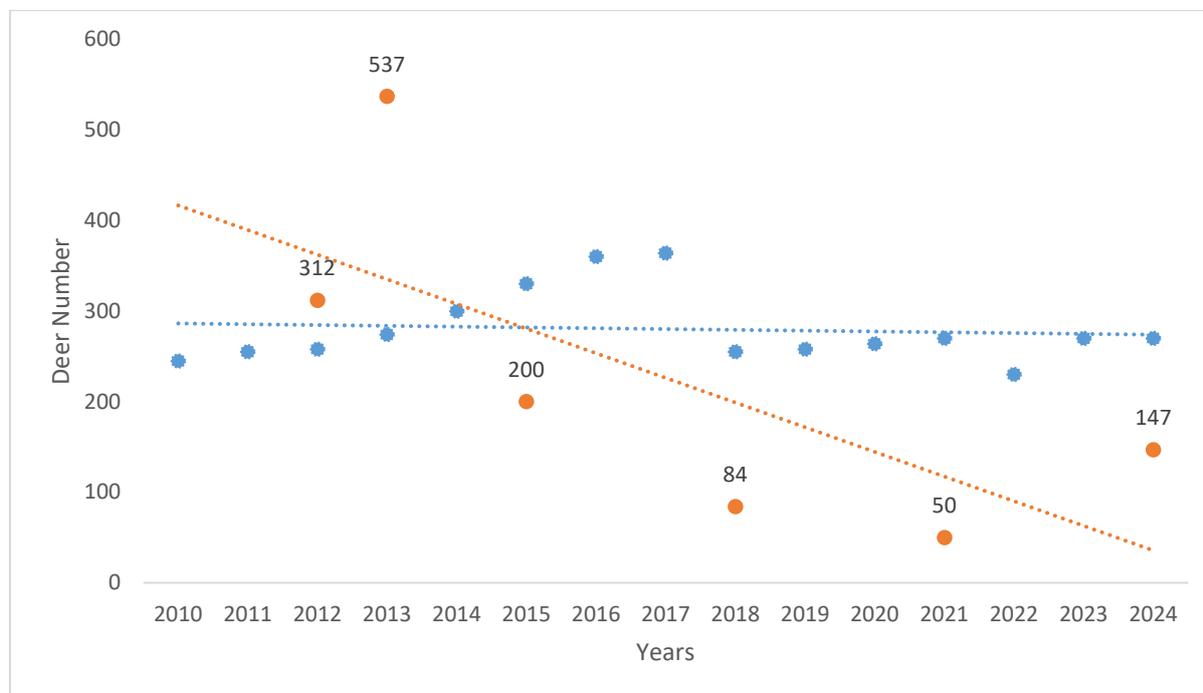
Figure 2. Red deer population trend in Lagodekhi Protected Area (LPA) during the last 14 years. Blue dots represent official data; orange dots represent Ilia State University and NACRES assessments results. Dotted lines indicate trends based on respective datasets.

3.3.3   National trends

The red deer populations in Lagodekhi and Borjomi-Kharagauli are the largest in Georgia and play a decisive role in shaping the species' national status. Smaller populations also persist elsewhere:

- **Adigeni area**: Adjacent to BKhPA, up to 20 individuals were recorded in 2017 (NACRES, 2016).
- **Gardabani Managed Reserve**: This small and apparently isolated population has remained since the last century. Independent estimates suggested ~30 individuals (Gurielidze et al., 2015), while the APA (2023) reported 78.
- **Tusheti PA**: A population near the Georgia–Russia border is officially reported at 85 individuals (APA, 2023). No independent assessments have been conducted here.

Table 1. Summary of recent red deer assessments in Georgia

Site	Red deer numbers	Source/Author	Population trend
Borjomi-Kharagauli PA	589–729	NACRES, autumn 2024 (BP project)	Positive

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Adigeni (adjacent to BKhPA)	20	NACRES, 2016	Unknown
Lagodekhi PA	147 (95% CI: 73–175)	NACRES, spring 2024 (BP project)	Negative
Tusheti PA	85	APA Report, 2023	Unknown, probably positive
Gardabani MR	31–78	Gurielidze et al., 2015; APA, 2023	Unknown, probably stable
Total population	**_798 - 1087 individuals_**		

The overall trend of the national red deer population over the last decade is shown in Figure 3.
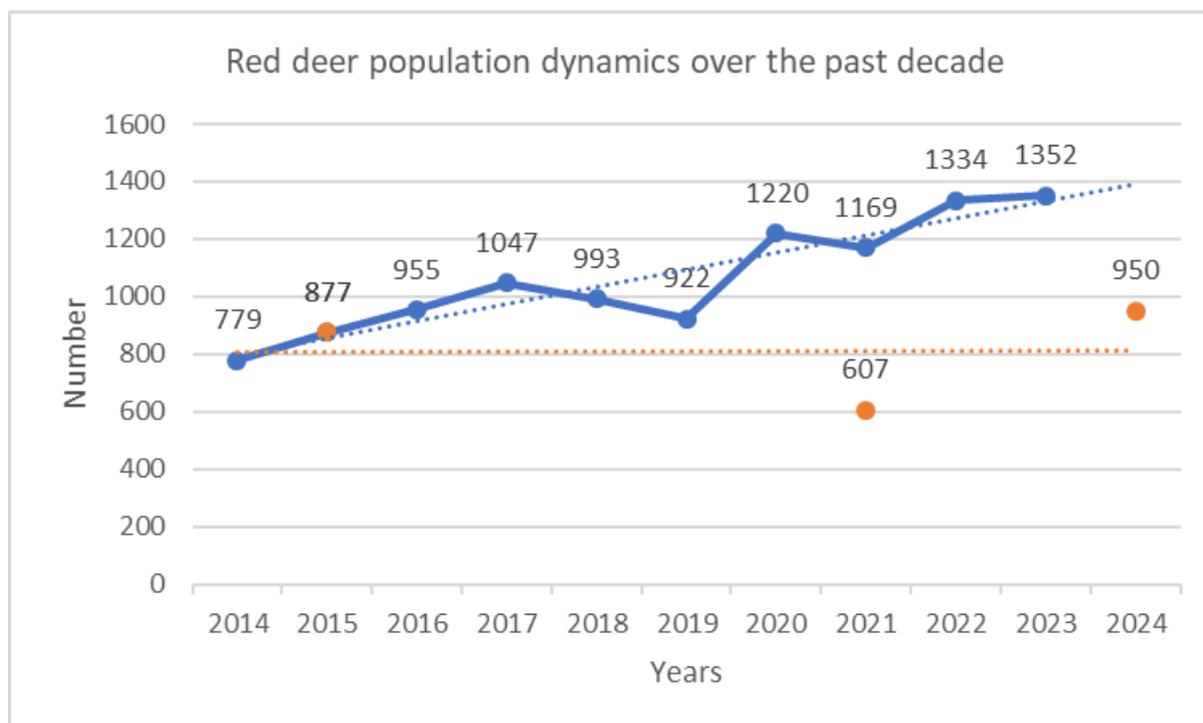
Fig. 3. Red deer population dynamics in Georgia in 2014–2024. The blue line represents official data; orange dots represent independent population assessment results. _Note: The Agency of Protected Areas accepted the independent (ISU) assessment result in 2015; hence, the data points for that year are the same._

While APA data indicate a clear positive trend, independent assessments portray a more cautious picture, suggesting stability rather than strong recovery. Regular monitoring—at least every three years—is recommended to further track the dynamics of this rare and vulnerable species in Georgia.

3.4   Modelling the habitat suitability and movement intensity of Red Deer in Georgia

Georgia's red deer populations are largely isolated, predominantly confined to protected areas (PAs). A rare exception exists in the Adigeni municipality, near Dertseli and Kikibo villages, where a group of red deer resides outside the PA but maintains a strong connection to the population within the Borjomi-Kharagauli Protected Area (BKhPA). However, the density of this connecting group is a striking

15 times lower than in adjacent areas within BKhPA. This significant disparity prompts a critical question: is the habitat outside protected areas genuinely unsuitable for red deer, leading them to remain within designated safe zones? Or, do suitable habitats exist beyond these boundaries, with other factors restricting or blocking the species' expansion?

To address these inquiries and inform future conservation strategies, red deer habitat suitability and movement were meticulously modelled within the project Rewilding Tbilisi National Park Ecosystem. Below are the study's main findings.

The habitat modelling exercise revealed a non-linear, bell-shaped relationship between deer presence and the cost distance from the border of protected areas within national parks. This suggests increased human disturbance near PA borders, while more distant sites exhibited less suitable conditions. The models also observed a plateauing response with elevation after 1500 meters above sea level and a slight negative monotonic relationship with the Terrain Ruggedness Index (TRI).

The MaxEnt best-fit model demonstrated excellent performance in predicting red deer habitat suitability. Its projection onto raster layers of six important explanatory variables (bare cover fraction, built-up cover fraction, crops cover fraction, grass cover fraction, shrub cover fraction, and tree cover fraction) identified significantly more suitable habitats for red deer than are currently occupied by the species (Map 3). The jackknife test of variable importance further indicated that tree cover fraction provided the most useful information, both independently and uniquely, among the variables. Consequently, the current limited distribution of the species, confined to only four protected areas, can be primarily attributed to the cumulative impact of overhunting throughout its historical range.
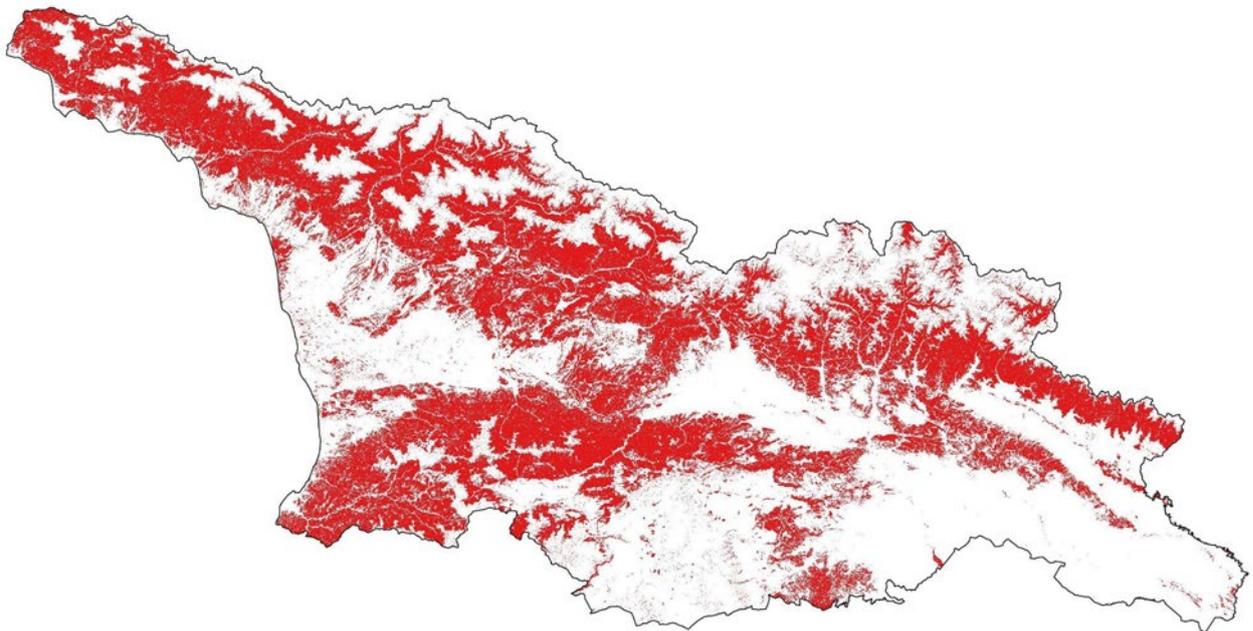
Map 3. *Binarized MaxEnt habitat suitability map of Red Deer (Cervus elaphus) using the maximum training sensitivity plus specificity cloglog threshold.*

The Isolation-by-Resistance (IBR) model of cumulative current flow, which serves as an analogue for the probability of gene flow or migration rate, highlighted potential corridors between six assumed or existed red deer source populations: North Western Caucasus, Turkey's Black Sea region, Gardabani

Managed Reserve, Lagodekhi National Park, Borjomi-Kharagauli National Park, and Tusheti National Park (Map 4).

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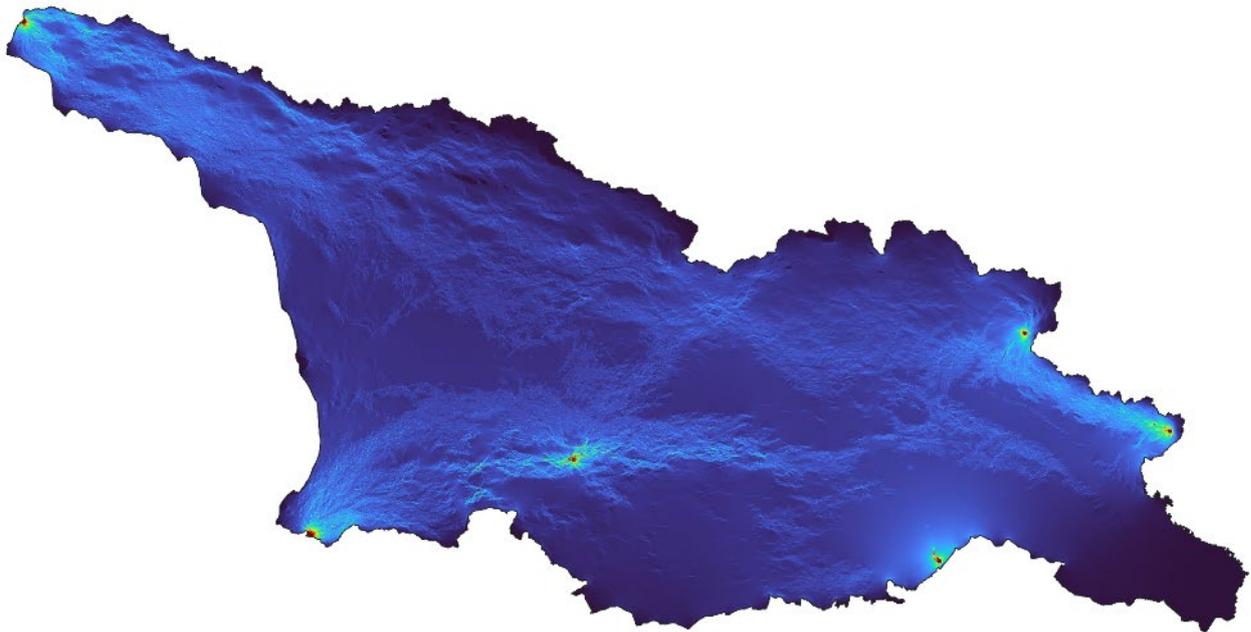
Map 4. *Isolation-by-resistance (IBR) model of cumulative current flow. Warmer colour predicts higher migration rate. The warmest areas are assumed source populations*

The model indicates that the Gardabani population is firmly isolated, with no individual movement expected in nearby habitats due to severe habitat destruction. While the Borjomi-Kharagauli PA, which hosts the largest population, has potential for expansion, it is most likely to occur westward and into parts of the Trialeti Range. In eastern Georgia, if threats are intensively managed, red deer could potentially recolonize the southern slopes of the Great Caucasus Ridge and connect to the Tusheti population. However, **Tbilisi National Park, despite being excellent deer habitat, cannot be naturally recolonized in the foreseeable future. Therefore, the only viable method to restore the red deer population in this protected area is through reintroduction**.

The potential impact of reintroduced and restored red deer populations in Georgia cannot be overstated. **Further movement modelling indicates that red deer could easily recolonize areas adjacent to Tbilisi National Park (Map 4). Notably, they could spread towards their historical range on the Tsiv-Gombori Ridge and into the northern forested part towards the Great Caucasus Ridge. According to the habitat modelling results, red deer could potentially reach the Tusheti population. This would represent a significant breakthrough for red deer conservation, not only in Georgia but also across the broader Caucasus region.**
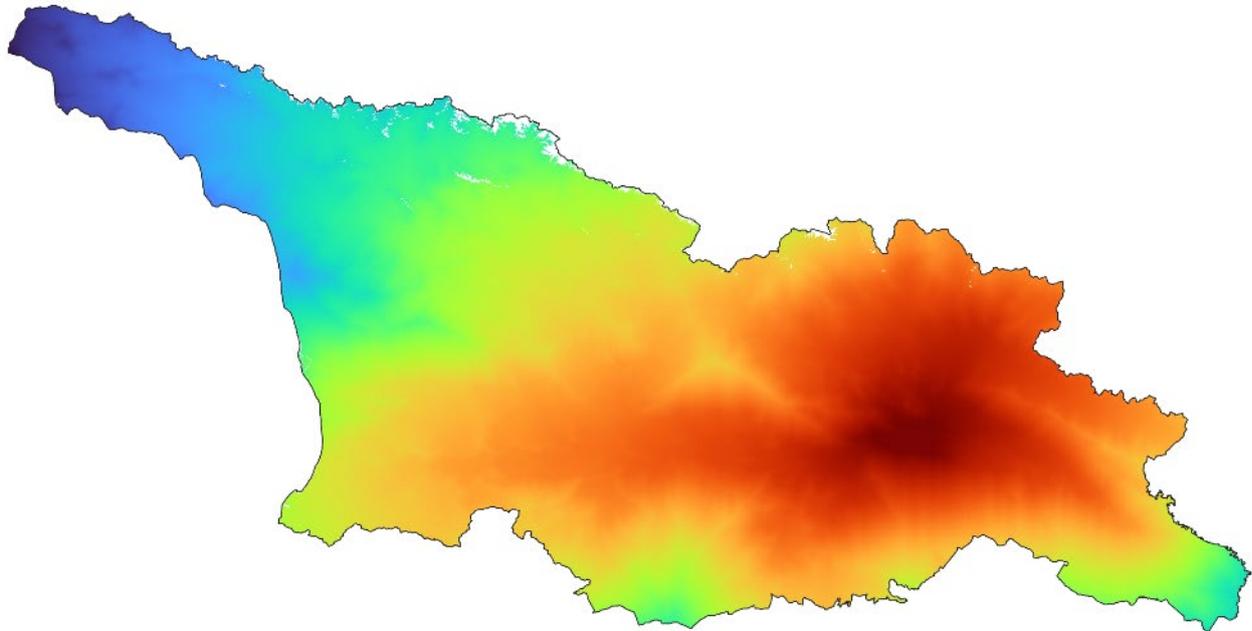
Map 5. A cost-weighted distance from Tbilisi National Park that is a proxy for Red Deer potential dispersal from Tbilisi National Park. Warmer colour predicts less effort to disperse from Tbilisi National Park.

3.5 Threats to red deer population in Georgia

The red deer populations in Georgia, despite some signs of recovery in specific protected areas, face a multitude of persistent and emerging threats that hinder their long-term survival and expansion. These threats operate across different scales and have significant impact on red deer population in Georgia.

3.5.1 Poaching and Illegal Hunting

Poaching remains one of the most significant and widespread threats to red deer across Georgia, including within protected areas. Researchers highlighted the negative effect of intensive hunting as early as the late 19th and early 20th centuries (Radde, 1899; Dinnik, 1910). Many scientists of the 20th century indicated in their articles the devastating effects of unregulated hunting on deer populations (Markov, 1934; Ekvtimishvili 1946, Vereshchagin, 1959; Arabuli, 1985; Janashvili, 1977; Kokhodze, 1991; Eriashvili, 1989; Badridze et al., 2000). It is considered a primary limiting factor keeping populations well below the carrying capacity of their habitats.

Beyond traditional trophy hunting, a newer motivation may be driving illegal hunting: the use of red deer antlers in folk remedies. Reports indicate that in some villages there is a belief that powdered antlers mixed with honey can cure serious illnesses such as cancer. This has created a black market in which antlers fetch relatively high prices—approximately 80–100 GEL (around USD 30) per kilogram. Such demand may incentivize not only the collection of shed antlers, causing additional disturbance, but also the direct shooting of stags. Further research is required to assess the actual scale and impact of this illegal antler trade on red deer populations in Georgia.

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3.5.2   Habitat Destruction

Habitat destruction, particularly deforestation, is considered one of the major threats to the red deer population. According to literature, red deer lived in lowland forests or often migrated from mountain forests to lowlands to overwinter during the cold time of the year. Due to deforestation and habitat destruction/fragmentation, red deer disappeared from almost all riverine forests in Georgia (Radde, 1899; Dinnik, 1910; Vereshchagin, 1959; Janashvili, 1977). The only riparian forest where a small group of red deer still persists is the Gardabani Managed Reserve on the Mtkvari riparian forest, which extends into Azerbaijan. This population is surrounded by settlements, road infrastructure, and large agricultural lands, and the group has operantly remained isolated at least from the Georgian side.

Large-scale infrastructure projects pose a growing threat, particularly to populations within or near developing areas. These projects can lead to direct habitat loss, increased fragmentation, disturbance, and potential barriers to movement. Particularly alarming are infrastructure projects within protected areas inhabited by red deer. For example, the construction of the Abastumani–Bagdadi road in BKHPA. This major project, connecting Samtskhe-Javakheti to western Georgia, involved widening existing roads and constructing new sections that cut through park territory. While compensatory measures like park expansion (e.g., inclusion of Kurtskhana gorge) have been implemented, it is unclear if these sufficiently offset the damage. A significant decline in red deer density has been observed in that area, which is thought to be caused by this infrastructure project (NACRES report, 2021). The need for mitigation measures such as green bridges and targeted monitoring is crucial. If not carefully planned and mitigated, infrastructural projects can isolate connected populations or further deepen present fragmentation, reduce habitat quality, and increase human access, potentially exacerbating other threats like poaching.

3.5.3   Livestock Grazing

Competition with domestic livestock for forage and space can be a limiting factor for red deer, especially during summer months when livestock are often moved to mountain pastures that overlap with red deer habitats. Livestock grazing can reduce the availability and quality of food resources for red deer and lead to habitat degradation. Furthermore, livestock can be a potential source of diseases, although no significant disease outbreaks have been detected in the Georgian red deer populations in recent years.

3.5.4   Tourism and Human Disturbance

While tourism can generate economic benefits and foster conservation awareness, poorly managed or high-intensity tourism may significantly disturb wildlife. In areas with strong poaching pressure, red deer often become wary of humans in general, which can lead them to avoid tourist-frequented zones and alter their habitat use, foraging behaviour, and daily activity patterns (Kobakhidze, 2017). Conversely, in some areas, the regular presence of visitors may help deter poaching by acting as a human shield. Given these contrasting effects, the influence of tourism on red deer and other wildlife should be carefully studied to inform effective management of protected areas.

3.5.5 Climate Change

Observable changes in local habitats—likely linked to climate change and/or altered grazing pressures—are influencing red deer ecology. In Lagodekhi PA, reforestation of formerly open subalpine zones is evident, with high-mountain maple and rowan encroaching upon alpine meadows. Such vegetation shifts can alter both the availability and quality of forage, as well as red deer's vertical movement patterns.

These changes may push red deer into different, often more rugged terrains, potentially heightening interspecific competition, for example with East Caucasian tur (*Capra cylindricornis*). Historically, red deer were frequently observed in subalpine (Markov, 1938) and even alpine meadows within Lagodekhi PA. They regularly sighted in subalpine meadows as recently as the late 1990s (Gurielidze, 2004). However, more recent observations suggest a preference for forest cover, at least during daylight hours.

This apparent behavioural shift may reflect altered food distribution and composition, but could also be driven by increased human disturbance (including poaching and tourism), interspecific interactions, or a combination of these factors.

3.6 Conclusions: Towards Red Deer Conservation in Georgia

- **Overhunting as the Primary Limiting Factor:** Despite historical habitat loss, the current severely limited distribution of red deer, confined to a few protected areas, is primarily attributable to the **cumulative impact of overhunting** throughout its historical range. This directly implies that strengthening anti-poaching measures and enforcing hunting prohibitions are paramount for any successful restoration efforts.
- **Abundant Unoccupied Suitable Habitat:** Modelling exercises demonstrate that **significantly more suitable habitats for red deer exist across Georgia than are currently occupied** by the species. This means that the ecological capacity for expansion exists, but is currently unrealized due to other limiting factors, mainly human-induced pressures and constraints.
- **Importance of Robust Monitoring:** Discrepancies exist between official and independent population assessments, highlighting the need for continued, regular, and independent monitoring. Such monitoring is essential to accurately track population dynamics, confirm trends, and inform adaptive management strategies for this rare species.
- **Critical Need for Connectivity and Reintroduction:**
  - Key red deer populations remain isolated. While some show potential for natural expansion into adjacent areas (e.g., Borjomi-Kharagauli PA to the west), others are firmly isolated due to habitat fragmentation (e.g., Gardabani).
  - Crucially, areas identified as excellent deer habitat, such as Tbilisi National Park, cannot be naturally recolonized in the foreseeable future. This leads to the direct conclusion that **reintroduction** is the only viable method to restore populations in such areas.
  - Furthermore, potential ecological corridors have been highlighted. The potential impact of reintroduced and restored red deer populations cannot be overstated. Successful reintroduction and facilitated movement could lead to the recolonization

of extensive historical ranges, including the Tsiv-Gombori Ridge and the northern forested part of the Great Caucasus Ridge, and potentially reaching the Tusheti population. This would represent a significant breakthrough for red deer conservation, not only within Georgia but also for the broader Caucasus region.

4 Legal Framework for Red deer Reintroduction

In 2006, the red deer was officially included in the Red List of Georgia under the "Endangered" category (C2a(i)), as stipulated by a decree from the President of Georgia. The new national Red List substituted the soviet-era Red Data Book. Thus, a complete ban on red deer hunting was maintained. Subsequently, the Ministry of Environmental Protection and Agriculture developed the National Biodiversity Strategy and Action Plan (NBSAP) for 2014–2020. Within this strategic document, the red deer was identified as a key species for Georgia. A specific action, designated as Activity C.2-o1.5 under Strategic Goal C and National Target C.2, mandated the development of a national Red Deer Conservation Action Plan.

In 2015, Ilia State University (ISU) developed a Red Deer Management Plan, which was accepted by the Ministry of Environmental Protection and Agriculture as a working document (Gurielidze et al., 2015). According to this plan, red deer reintroduction should be carried out in protected areas, as these territories ensure a level of protection from illegal hunting, the primary cause of the species' decline in Georgia. The Red Deer Management Plan identified two candidate protected areas for reintroduction: Tbilisi and Algeti National Parks. Both protected areas are expected to facilitate the dispersal of the red deer population into nearby suitable habitats, thereby supporting the recovery of the species across Georgia (Gurielidze et al., 2015).

In 2025, the Ministry of Environmental Protection and Agriculture adopted the Caucasian Red Deer Recovery Plan (2025), which fully aligns with the National Red Deer Management Plan (2015) and designates Tbilisi and Algeti National Parks as priority reintroduction sites.

The Law of Georgia on Protected Areas System regulates activities within these areas based on their designated category (Georgian Law on the Protected Area System, 1996). According to this law, active conservation measures to restore ecosystems and endangered species can be implemented in special zones of a national park. Tbilisi National Park is divided into four main zones: a Strict Protection Zone, a Traditional Use Zone, a Historical Zone, and a Visitor Zone (Tbilisi NP Management Plan, 2024). While active conservation measures are prohibited in the Strict Protection Zone, the other zones can be considered as potential release sites for a founder group of red deer. This zoning provides conservationists with a wide variety of options for planning the restoration of the red deer population in Tbilisi National Park (Map 6).
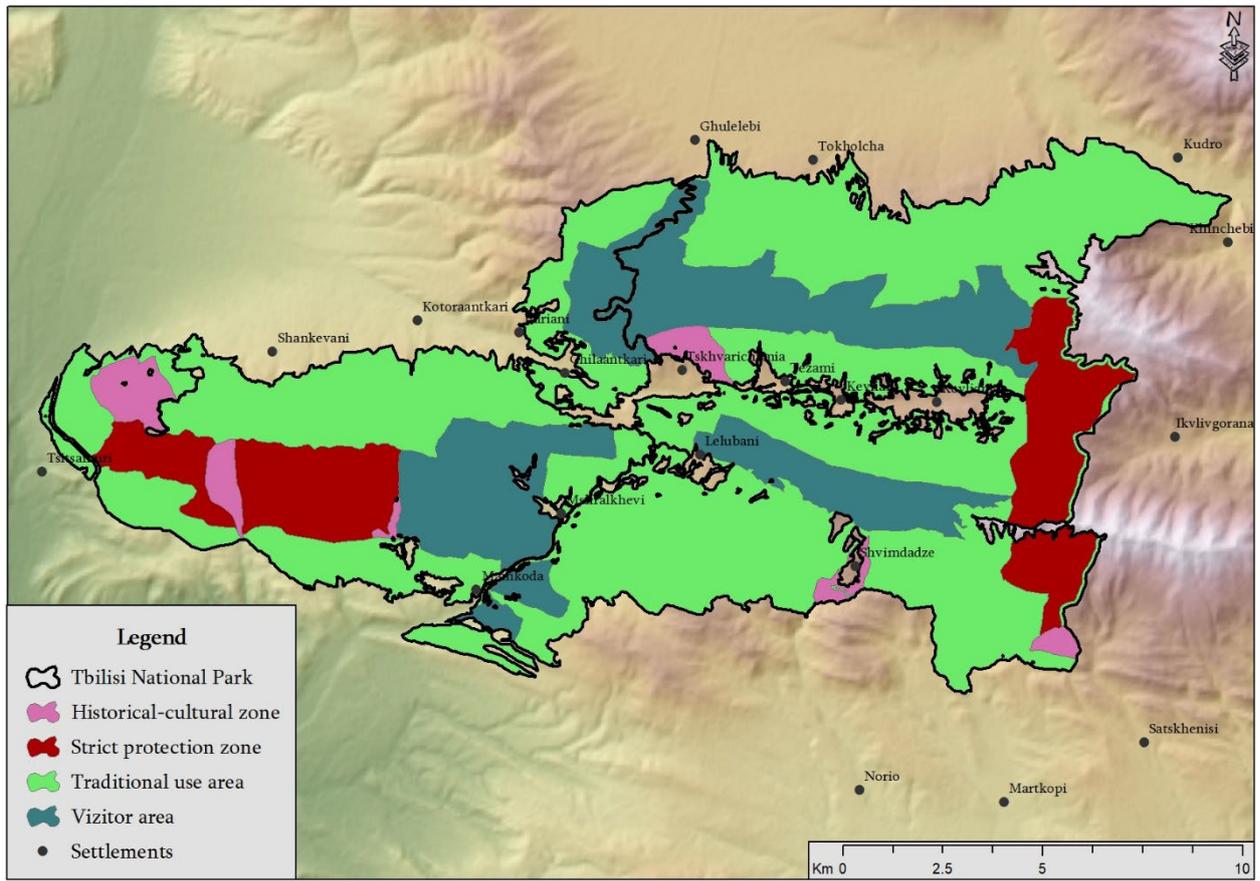
Map 6. Tbilisi national park zoning. Source: Tbilisi National Park Management Plan (2024)

5 Reintroduction Site – Tbilisi National Park

Tbilisi National Park provides an ideal environment for the red deer, boasting suitable habitats and the advantage of protected status. Red deer historically inhabited this area until they declined and ultimately vanished in the late 1980s. The park's strategic location is also key to the long-term vision for red deer recovery at the national level. Its forest habitats extend to the east and north, offering the potential for the restored red deer population to naturally disperse towards the Greater Caucasus Ridge and reclaim a larger portion of their historical range.

5.1 History and past management

The history of Tbilisi National Park as a protected area began with Resolution No. 35 of the Council of People's Commissars of the Georgian SSR, issued on January 17, 1946, which designated the Saguramo Forest as the Saguramo State Nature Reserve. In 1951, the reserve was abolished along with several others, but in 1957 it was re-established, with its forest massifs declared a sanctuary for both flora and fauna. In 1973, adjacent territories were designated as Saguramo National Park, which was later renamed Tbilisi National Park in 1979.

On December 3, 2007, the Parliament of Georgia adopted the Law *On Tbilisi National Park*, which formally created the park in its modern form. The newly established protected area incorporated the Saguramo Nature Reserve, the former Tbilisi National Park, and additional forested lands, covering a total of 24,327.8 hectares. Following a subsequent territorial demarcation, certain areas were excluded, and on June 3, 2015, the Parliament amended the law, reducing the park's area to 21,036.14 hectares.

5.2 Short Description of the Tbilisi National Park

Tbilisi National Park is situated along the Saguramo-Ialno ridges, covering a total area of about 210 km². The protected area is spread across the southern and northern slopes of the Saguramo, Ialno, and Sabaduri ridges. To the north, it is bordered by the villages of Tianeti Municipality (Magraneti, Tokholcha, Ghulelebi, Zemo Nakalakari, Trani, Khadoelebi, Tskharotubani, Tolaantsopeli, Gudanelebi, and others). To the west, it is bordered by the Aragvi River and the Tbilisi-Senaki-Leselidze highway. To the south, it is bordered by the Tbilisi bypass road and the villages of Gardabani Municipality (Norio, Martkopi). To the east, it is bordered by the Iori River and Sagarejo Municipality (Tbilisi NP MP, 2024). The majority of the park lies within the Mtskheta-Mtianeti region, with smaller sections extending into Tbilisi and Kvemo Kartli (Map 7).

The terrain is rugged, characterized by deep gorges and steep slopes. The park is predominantly covered with broadleaf forests interspersed with small clearings and meadows. Elevation ranges from 501 to 1,795 meters above sea level. The climate is moderate, with average summer temperatures of 24–26°C and winter temperatures ranging from 0 to 2°C.
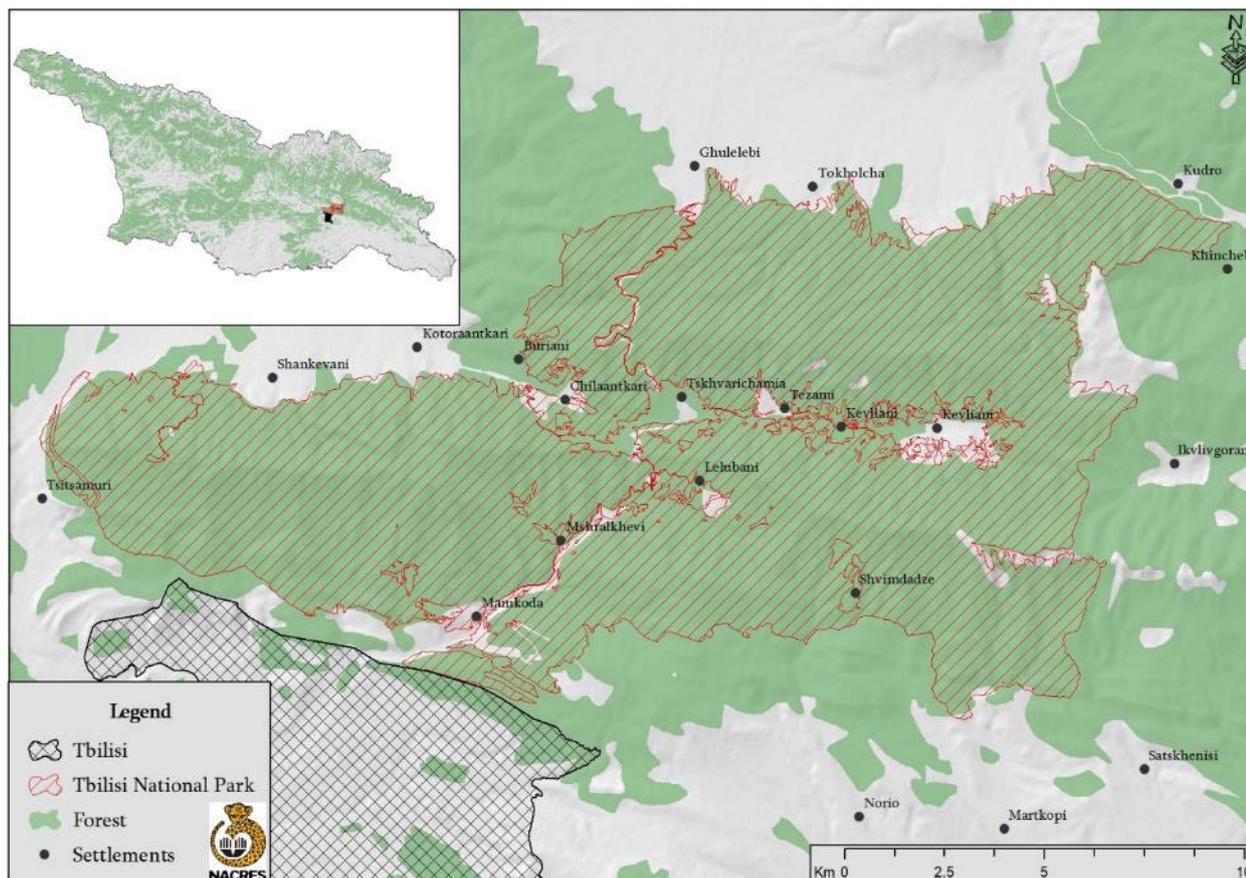
Map 7. Tbilisi national park

5.3 Biodiversity

Tbilisi National Park (TNP) hosts a rich and diverse flora, comprising 699 recorded plant species, including 114 woody and 581 herbaceous species. The park is almost entirely forested, with woodland covering 20,489 hectares. The dominant forest type is Oriental beech (*Fagus orientalis*), which accounts for 60.8% of the total forest area. Georgian oak (*Quercus iberica*) and hornbeam (*Carpinus betulus*) are also widespread, while common ash (*Fraxinus excelsior*) and Oriental hornbeam (*Carpinus orientalis*) occur in scattered stands across the park. The forest undergrowth features a variety of shrubs, including hawthorn, cornelian cherry, medlar, spindle tree, and smoke tree. Unique groves of common yew (*Taxus baccata*) are present in the understorey, alongside areas of artificially planted pine woodland.

Several species listed on the Georgian Red List also occur in Tbilisi National Park, including Colchian boxwood (*Buxus colchica* Pojark.), common yew (*Taxus baccata* L.), wych elm (*Ulmus glabra* Huds.),

field elm (*Ulmus minor* Mill.), Kikodze's willow (*Salix kikodseae*), and stinking juniper (*Juniperus foetidissima*), among others.

Photos 3 and 4. *Typical Forest habitat and landscape in Tbilisi national park*

The park is home to a variety of bird species, with the European jay (*Garrulus glandarius*) and common blackbird (*Turdus merula*) being the most widespread and commonly visible species. Three species of woodpeckers inhabit the forest: green woodpecker (*Picus viridis*), great spotted woodpecker (*Dendrocopos major*), and black woodpecker (*Dryocopus martius*).

The following key mammals are found in Tbilisi NP: red fox (*Vulpes vulpes*), grey wolf (*Canis lupus*), golden jackal (*Canis aureus*), Indian crested porcupine (*Hystrix indica*), hare (*Lepus europeaus*), pine marten (*Martes martes*), wildcat (*Felis silvestris*), raccoon (*Procyon lotor*), badger (*Meles meles*), red squirrel (*Sciurus anomalus*), least weasel (*Mustela nivalis*), and other small mammals. The roe deer (*Capreolus capreolus*) is the only ungulate species currently inhabiting the park. The Eurasian lynx (*Lynx lynx*) and brown bear (*Ursus arctos*) are rare.

Till the late 1980s, a small population of red deer (*Cervus elaphus maral*) existed in Saguramo Reserve (presently part of TNP). Local residents still recall the presence of this large herbivore in the forests near Tbilisi. Notably a leopard (*Panthera pardus*) was killed near the approaches of Zedazeni ridge in 1954.

5.4   Large mammal assessment 2024

The mammal populations of Tbilisi National Park have never been systematically assessed, and no reliable data exist on the status of large mammals, including large carnivores, within the protected area. The presence and abundance of large carnivores are highly relevant to red deer restoration, as these predators are the species' natural enemies.

By preying on reintroduced individuals, large carnivores—particularly wolves—may hinder the recovery of translocated red deer populations. Understanding the status of grey wolves in Tbilisi National Park is therefore essential. Other carnivores, including jackals, lynx, and brown bears, may also limit red deer offspring survival and influence the success of reintroduction efforts.

Estimating large mammal densities is inherently challenging and costly, especially over short timescales. To address this, camera trapping was selected as the most suitable method for assessing the status of key species in the park. The study applied the Random Encounter Model (REM; Rowcliffe et al., 2008), which enables estimation of species densities without the need for individual identification while yielding valuable insights into population status.

The Random Encounter Model (REM) was applied for the first time in Tbilisi National Park. Its implementation required significant effort from fieldworkers and considerable time for the installation of sufficient number of camera traps. The method proved extremity effective, yielding comprehensive data for nearly all large and medium mammal species distributed within the national park.

The study successfully assessed the population densities of thirteen species including key carnivore – grey wolf (Table 2). Brown bear (*Ursus arctos*) was recorded only once, resulting in insufficient data for density calculations. The photographed individual appeared young and likely wandered across large territories. This single detection clearly indicates a low population density for bears. Lynx (*Lynx lynx dinniki*) were recorded twice. Based on body marks, they were different animals, suggesting that at least two individuals live on TNP. Evidently, the densities of both bears and lynx are so low that they are unlikely to pose a significant limiting factor for a newly translocated red deer population.

The status of the grey wolf (Canis lupus) in Tbilisi National Park is of particular concern in the context of red deer restoration. As a top predator, the species generally occurs at low densities, typically ranging from 1 to 3 individuals per 100 km² depending on prey availability and human pressure (Blanco & Sundseth, 2023; Mech & Peterson, 2003). In TNP, a density of approximately 5 individuals per 100 km² should be considered relatively high compared to wolf populations elsewhere and is comparable to densities recorded in human-dominated landscapes of Spain, where 5–7 individuals per 100 km² have been observed (Blanco et al., 1992). However, given the park's relatively high prey density—particularly roe deer (see below)—even larger wolf numbers might reasonably be expected. Current evidence suggests the presence of a single wolf pack, consisting of around five adult members, occupying the eastern and northeastern sections of the park.

Table 2. *Results of 2024 large mammal assessment in Tbilisi national park. [The estimated densities are per 1 km². N is population numbers calculated for study area of 100 km².]*

Common name	Scientific name	Estimate (n/km2)	N
Golden jackal	Canis aureus	0,082	8
Wolf	Canis lupus	0,049	5
Dog (general)	Canis lupus familiaris	0,312	31
Stray dogs	Canis lupus familiaris	0,22	22
Roe deer	Capreolus capreolus	7,699	770
European hedgehog	Erinaceus europaeus	0,213	21
Wild cat	Felis silvestris	0,045	5
Hare	Lepus europaeus	0,566	57
Eurasian lynx	Lynx lynx	0,010	1
Stone marten	Martes foina	0,028	3
Pine marten	Martes martes	0,741	74

Badger	Meles meles	0,142	14
Racoon	Procyon lotor	0,495	50
Red fox	Vulpes vulpes	0,518	52

The golden jackal (Canis aureus) population within Tbilisi National Park appears to be low. In the literature, jackals are typically reported at densities of about one family group per square kilometre (Hoffmann et al., 2018), whereas in TNP the density is estimated at fewer than one individual per square kilometre. It should also be noted that the application of a buffer along the park's boundary may have excluded habitats more suitable for jackals, particularly lower-elevation areas near villages. Despite this, overall jackal numbers appear markedly lower than expected, likely influenced by illegal hunting. In 2021–2022, some hunting organizations reportedly placed unofficial bounties on wolves and jackals, encouraging hunters across Georgia to kill as many individuals as possible in exchange for rewards. This practice was especially pronounced near large settlements, including Tbilisi, where local jackal populations have reportedly been reduced to near-extirpation.

As shown in the table, domestic dogs (*Canis lupus familiaris*) outnumber wolves in Tbilisi National Park by a factor of six. Among them, some were identified as pure hunting breeds—primarily used for pursuing large game—and in certain cases equipped with collars, including GPS tracking devices. Entering the park with hunting dogs constitutes a violation of the protected area regime. However, hunting dogs from surrounding rural areas may also wander independently into the forest and chase deer, driven by their strong prey instinct. The significant presence of hunting dogs within TNP highlights the urgent need for strengthened law enforcement. Protecting biodiversity in heavily urbanized landscapes is particularly challenging, as poachers have rapid and often discreet access to most parts of the park. To address this, the TNP administration requires additional support in the form of equipment, training, and operational capacity to combat poaching more effectively.

After separating stray dogs from those that are presumably owned (e.g., collared hunting dogs), approximately 22 stray dogs were recorded within the park. This number is five times higher than the wolf density and 2.5 times higher than that of the jackal. The elevated abundance of free-ranging dogs may indirectly reflect the reduced density of native carnivores, particularly wolves, relative to the available prey and habitat. If illegal carnivore control continues both around and within the park, stray dog numbers are likely to rise further, potentially filling the ecological niche of large carnivores. Such dynamics may accelerate wolf–dog hybridization, producing hybrids that could display heightened aggression toward humans and increase the risk of livestock depredation, thereby intensifying human–carnivore conflict (Blanco & Sundseth, 2023).

The study documented, through both direct observations and camera trapping, that groups of stray dogs frequently pursue roe deer. Although the extent to which stray dogs depend on wild prey remains unclear, their tendency to chase ungulates suggests they could pose a significant threat to newly released red deer. While dogs may be less capable of killing adult red deer, they can strongly impact the survival of fawns and juveniles. In addition, stray dogs may influence habitat selection by reintroduced deer, and even non-lethal chases could hinder adaptation to new environments and reduce survival rates.

Spatial patterns of detection revealed that wolves were recorded more frequently in the northeastern and eastern parts of the study area, whereas stray dogs were more concentrated in the west (Maps 8 and 9). Although not definitive, the data indicate a possible negative correlation between wolf presence and stray dog distribution.
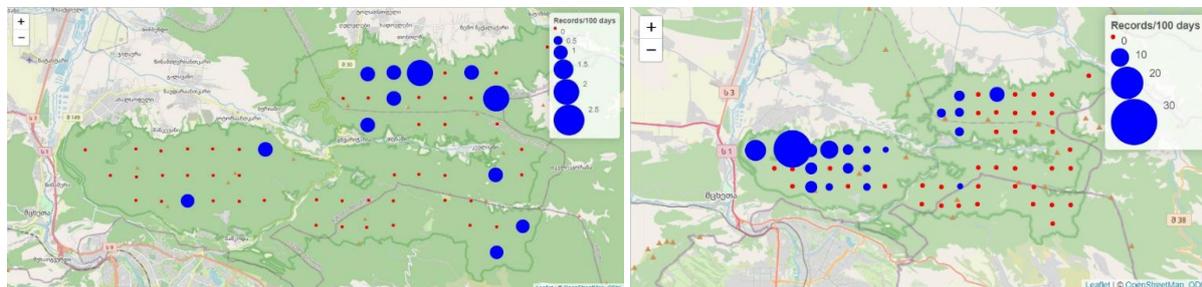
Map 8 and 9. Wolf (left) and stray dog (right) frequency of detection on camera traps in TNP

Notably, the density of roe deer (*Capreolus capreolus*) in Tbilisi National Park is remarkably high, with an estimated 8 individuals per km². This roe deer density is the highest ever detected in Georgia and is comparable to areas with high roe deer density in Europe (Burbaitėa L., and Csányib S., 2009).

Conclusions:

- The REM camera trap methodology demonstrated high efficacy, successfully detecting all expected medium- and large-sized mammal species. Density estimates were obtained for 13 species, providing a robust baseline for longitudinal monitoring, which is recommended at three-year intervals using identical protocols.
- Roe deer density in Tbilisi National Park is the highest recorded in Georgia and is comparable to levels observed in European systems with low carnivore pressure. Due to ecological niche differentiation, roe deer and red deer are not direct competitors and can coexist, as demonstrated in Lagodekhi and Borjomi-Kharagauli protected areas. Moreover, the high density of roe deer may facilitate red deer restoration by creating a temporal buffer before resident wolves shift to preying on red deer, evidently the preferred prey of wolves, when available.
- The structure of the large mammal assemblage, as revealed by the rapid biodiversity assessment, indicates that current ecological conditions are conducive to red deer reintroduction. The relatively low abundance of large carnivores enhances the likelihood that translocated red deer will successfully establish home ranges.
- The high detection frequency of purebred hunting dogs likely reflects a certain level of poaching pressure within Tbilisi National Park. This suggests that enforcement capacity to control illegal hunting requires strengthening.
- Stray dogs constitute a potential limiting factor for red deer restoration, as they may disturb translocated individuals, reduce juvenile survival, and thereby constrain population recovery dynamics.
- There is potential for wolf–dog hybridization, which presents significant ecological and management risks. These include disruption of natural predator–prey dynamics, possible

displacement of the native wolf population, and heightened threats to both wildlife and people. Hybrid individuals may exhibit increased aggression toward humans and a higher propensity for livestock depredation, thereby intensifying human–carnivore conflict.

Insert 1: **Rapid Mammal Assessment in Tbilisi National Park - 2024**

The rapid assessment in TNP was conducted during August – December 2024 using the Random Encounter Model (REM), which provided data on the presence and abundance of all large and medium sized mammals on the park.

The REM Method

This model uses the 'ideal gas theory' applied to animals (i.e., animals treated as gas molecules) to estimate population density on the basis of the contact rate (i.e., number of encounters per time unit), animal speed and intrinsic measurements of the detection field of the camera. Animal speed is the most challenging parameter to estimate and can be derived from spatial ecology studies (based on the application of GPS collars) or directly from camera trap data (Rowcliffe et al. 2008). The formula to estimate the density with REM is:

$$D = \frac{y}{t} \frac{\pi}{vr(2 + \theta)}$$

where y is the number of encounters, t is the total survey effort, v is the daily range (i.e., product of animal's activity and speed), r is the effective detection radius, and θ is the effective detection angle.

Key assumptions of the REM method are as follows:

i.   Camera traps are placed randomly with respect to the spatial distribution of animals;
ii.   Animals passing in a certain field of view of the camera (detection area) are detected with certainty;
iii. Animal movement and behaviour are not affected by the cameras;
iv.   The population is closed during the study period.

Study Area and Data Collection

Several technical considerations influence the accuracy and precision of estimates generated using the Random Encounter Model (REM). A critical factor is the relationship between the size of the study area and the number of camera traps required to produce reliable density estimates. For Tbilisi National Park (21,000 hectares), the REM protocol indicated a need for substantially more camera traps than were available. To address this limitation, camera deployment was optimized by applying a 500-meter internal buffer along the park's boundary, thereby reducing the effective sampling area to 10,000 hectares (100 km²). Within this area, 57 grid points were established for camera trap placement (see map below).
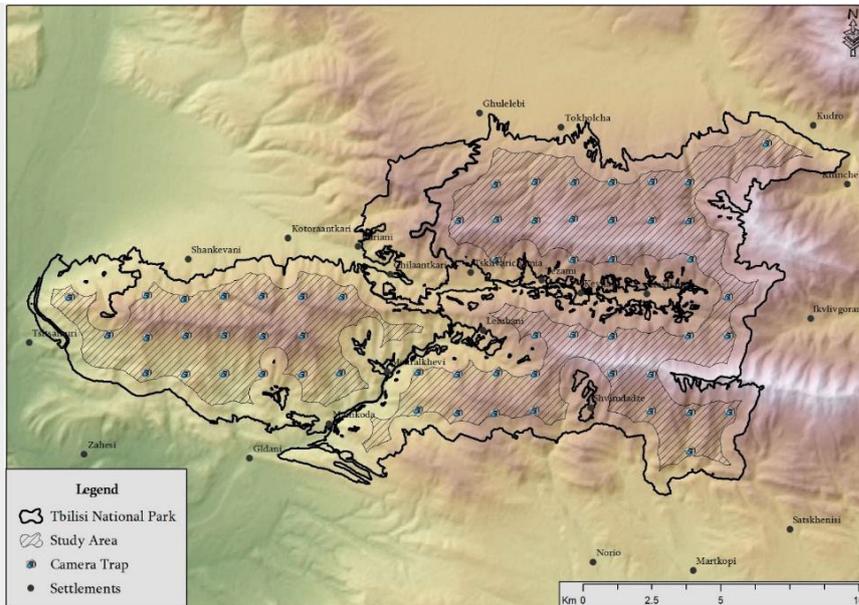
While installing each camera was carefully calibrated and the surrounding area was cleared of grass and branches to minimize false triggers. According to the REM protocol, if a predetermined location was unsuitable for deployment (e.g., due to extreme slope or dense vegetation), an alternative site had to be found within a 100-meter radius. If no suitable location was found, the grid point was skipped, and the next closest point was selected. The camera traps were mounted on trees at a height of 50 cm above the ground.

Installing camera traps in Tbilisi national park

The camera traps operated continuously, 24 hours per day, and were configured to capture up to eight consecutive images (the maximum capacity) with the shortest possible interval between triggers (0 seconds where feasible). When available, the rapid-fire mode was employed to minimize delays within image sequences. Sensitivity was set to medium to balance detection accuracy against

false activations. The time lapse between consecutive images was restricted to 2–3 seconds to ensure compliance with the Random Encounter Model (REM) protocol.

In line with REM requirements, each camera remained active for a minimum of 60 days to secure reliable density estimates. All cameras were removed in November, resulting in deployment periods exceeding two months. Throughout this time, all units functioned without incident—no damage or theft occurred, and data were successfully retrieved from every device.

The survey yielded an extensive dataset comprising more than 250,000 images. Each image was screened to eliminate false triggers and empty frames. The cleaned dataset was then uploaded to the Agouti Platform (https://agouti.eu/), where artificial intelligence (AI) tools provided preliminary classification by species and timestamp. As AI classification accuracy can vary, all identifications were manually verified to ensure data integrity.

Final analyses were conducted using the R programming language, following REM guidelines provided by the European Observatory of Wildlife (EOW).

Representative images from the camera trap dataset:
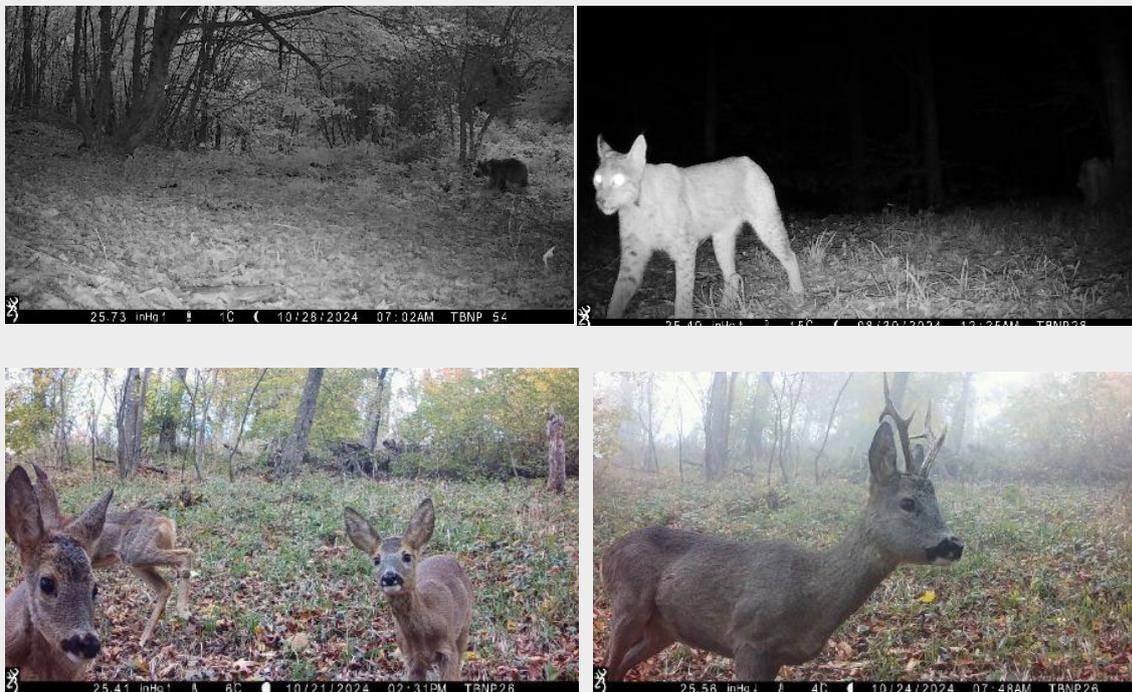
From left to right: Brown bear; Eurasian lynx; Roe deer female group; Roe deer stag.

5.5   Tbilisi National Park Capacity

The administration of Tbilisi National Park (TNP), as the body responsible for its protection and effective management, is the key player in the successful reintroduction of red deer. They are expected to play a crucial role both during the reintroduction phase and afterwards in protecting the new red deer population and ensuring its growth and long-term viability.

The return of red deer to the park is likely to generate additional management challenges, particularly for the law enforcement unit, which will be required to mitigate an anticipated increase in poaching pressure. Despite having been legally protected since Soviet times, red deer remain one of the most popular and sought-after game species and a frequent target for poachers.

Below is a summary of the results and findings from the TNP administration's capacity needs assessment, with particular emphasis on management and operational strengthening in the context of red deer restoration[2]. The assessment was designed to provide a detailed understanding of the current state of the park's management, human resources, operational capacity, infrastructure, and biodiversity conservation practices. It identified gaps and challenges that could impact the successful implementation of the red deer restoration initiative and other management objectives.

5.5.1   Current capacity of TNP administration

Detailed assessment of TNP Administration identified significant gaps in human resources, technical capacity, infrastructure, and operational practices. Addressing these gaps is essential to support the red deer restoration initiative, strengthen biodiversity monitoring, enhance law enforcement and protection, develop ecotourism, and engage local communities. A systematic approach to capacity building, resource allocation, and operational improvement will be crucial for achieving long-term conservation and sustainable management objectives.

Management and Governance:

The TNP Administration operates as a territorial unit under the Agency of Protected Areas (APA) of Georgia, which falls within the Ministry of Environmental Protection and Agriculture. The Agency provides overarching governance, while the local administration is responsible for operational implementation.

Management   Plan:
The official Management Plan for TNP was approved in June 2024, providing a framework for annual action plans and conservation activities. However, the assessment revealed that systematic monitoring and evaluation of the Management Plan is not yet institutionalized. The administration recognizes the need for standardized procedures to track progress, produce annual reports, and

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[2] Training and Resource Needs Assessment for Tbilisi National Park Administration, Natia Muladze 2025

inform adaptive management strategies. Staff involvement in the development of the Management Plan has been limited, highlighting a need for more inclusive planning processes.

Human Resources:

The administration employs 42 staff members, including a director, heads of Protection and Administrative Divisions, specialists for Visitor Services and Natural Resources, Chief Rangers, and Rangers. While the workforce has substantial experience (majority with 5–10 years of service), key challenges include: Insufficient number of rangers relative to the park's area; Absence of structured, position-specific training programs; Lack of formal professional development for new or existing staff; Highstaff turnover, particularly in 2017–2018, though stability has improved since 2019.

Protection and Patrolling:

The Protection Division is the largest operational unit and is responsible for enforcing park regulations, patrolling, and anti-poaching efforts. Currently, there are gaps in coverage, outdated equipment, and a lack of advanced technologies such as SMART patrolling (already successfully used in other Georgian parks). Key challenges include insufficient ranger stations, limited communication tools, and outdated field equipment.

Biodiversity Monitoring:

Monitoring of flora and fauna is limited and primarily reliant on external partnerships with universities and NGOs. The administration lacks technical expertise in species-specific monitoring. There is a need for specialized personnel, training, and monitoring equipment to support the reintroduction program and ongoing conservation initiatives.

Natural Resource Management:

Although a forest management plan exists (2020–2029), implementation requires staff training in forest inventory use, sustainable harvesting, and habitat conservation. Integrating these practices with broader park management objectives is critical for balancing conservation and sustainable resource use.

Ecotourism and Visitor Services:

Ecotourism infrastructure remains underdeveloped, with limited trails and interpretive facilities. While small-scale infrastructure projects exist (Sabaduri Forest, Mamkoda area), there is a clear need for staff training in visitor management, tourism product development, and interpretive services.

Environmental Education and Community Engagement:

Current outreach efforts are limited in scope and largely dependent on a few staff members. Local communities have limited awareness of park objectives and conservation initiatives. Dedicated personnel, structured education programs, and targeted communication strategies are necessary to strengthen public engagement.

Key Findings:

1. Capacity Gaps: Insufficient ranger coverage, lack of specialized monitoring personnel, and absence of position-specific training programs.
2. Infrastructure Limitations: Outdated field equipment, insufficient ranger stations, inadequate signage, and underdeveloped visitor infrastructure.
3. Operational Weaknesses: Limited implementation of Management Plan monitoring, absence of SMART patrolling, and insufficient emergency preparedness.
4. Biodiversity Monitoring Needs: Need for additional staff, specialized training, and advanced monitoring tools for red deer restoration and overall ecological management.
5. Community and Visitor Engagement: Need for dedicated environmental education staff, targeted outreach programs, and improved interpretive materials.

5.5.2 Training and Resource needs of TNP Administration

The operational capacity, skills, and resources of the TNP administration will be crucial in the rewilding the ecosystem and restoration of deer in Tbilisi National Park. As the restoration of the red deer population represents a complex and resource-intensive undertaking it requires highly trained staff, adequate infrastructure, and modern equipment.

Below is a structured overview of the specific training programs and resource investments required to strengthen the park's institutional and operational capacity. It focuses on building competencies in core areas such as law enforcement, biodiversity monitoring, forest management, ecotourism, environmental education, and community engagement. At the same time, it identifies critical infrastructure and equipment needs, including ranger stations, patrolling technologies, monitoring tools, and educational facilities.

By aligning training priorities with resource requirements, the following a strategy for enhancing the capacity of Tbilisi National Park staff and creating the enabling conditions necessary for the successful implementation of the red deer restoration initiative. Ultimately, these measures will contribute not only to the rewilding project but also to the park's broader mission of biodiversity conservation, sustainable management, and community partnership.

5.5.3 Training and Resource Estimates

- **TRAINING NEEDS OVERVIEW**

Activity Field	Training Need	Target Group	Priority
Protected Area Management	Monitoring & evaluation of Management Plan	Management staff	Average
Protection & Patrolling	Law enforcement, anti-poaching training	Rangers, Chief Rangers	High
Protection & Patrolling	SMART patrolling & digital data collection	Rangers, Chief Rangers	High
Safety	First Aid & Emergency Response	All field staff (≈40)	High

Biodiversity Monitoring	Data collection & analysis (camera traps, GPS, GIS)	Natural Resource Specialist + rangers	High
	Red deer monitoring (tracking, behaviour, population)	Natural Resource, Rangers, Specialists	High
Forest Management	Forest inventory use & sustainable harvesting	Specialist, Rangers	Average
Ecotourism	Visitor management & interpretation services	Visitor staff, Rangers	Average
Environmental Education	Communication & interpretation, Junior Ranger program	Education/Visitor staff, Rangers	Average
Community Outreach	Communication strategies, conflict mitigation, awareness campaigns	Rangers, Visitor staff, Community liaison	High

RESOURCE NEEDS OVERVIEW

Resource Category	Item	Quantity	Priority
Human Resources	Additional Rangers	5	High
	Environmental Education Specialist	1	Average
Infrastructure	Ranger Stations	3	High
	Boundary Markers & Signage	50	High
	Visitor Information Boards	20	High
Equipment	Binoculars	20	Average
	GPS Navigation Devices	10	Average
	Camera Traps	30	High
	Drone	1	Average
	Smartphones for SMART patrolling	20	High
	Firefighting Kits	5	High
Safety	First-aid Kits (field-ready)	40	High
Office & Education	Printed & Interpretive Materials	-	Average
	Educational Trail + Exhibition Space	-	Average
Communication & Outreach	Public awareness campaign (videos, brochures, posters, social media content)		High

	Community engagement events (meetings, school programs, village workshops)		High

5.6 Veterinary Situation and Disease Risk Assessment

5.6.1 Red Deer and Livestock Veterinary Status

Livestock and red deer share a number of diseases that can be transmitted between species through direct contact, vectors, or other indirect pathways. Consequently, a clear understanding of the overall veterinary situation in and around Tbilisi National Park (TNP), as well as the health status of domestic animals that may directly or indirectly interact with the released red deer, is of critical importance. The central questions are: *What is the general veterinary situation in the TNP region? What are the levels of risk of disease transmission from domestic livestock to released red deer? Do these risks differ from those in the areas of the source population?* In other words, would the released animals be exposed to elevated risks of contracting diseases from local livestock?

This knowledge is essential for designing appropriate measures to mitigate potential risks to both the released individuals and the future red deer population.

Although TNP is surrounded by human settlements where many households keep livestock, it is unlikely that released red deer will frequently come into direct contact with domestic animals inside the park. Being wild-caught, they are also expected to actively avoid humans and thus rarely approach settlements. Nevertheless, specific measures are needed to minimise the risk of disease transmission in both directions (between red deer and livestock). These measures may be short-term—focused on the release phase—and long-term—ensuring sustained risk reduction as the red deer population becomes established and begins to expand.

The following section provides a summary of the key findings from the veterinary assessment conducted in villages surrounding Tbilisi National Park in 2025[3].

5.6.2 Livestock Farming Around TNP

Two main categories of livestock are present in the areas adjacent to Tbilisi National Park:

1. **Village livestock** – animals kept by residents of nearby villages.
2. **Migrating livestock** – herds that pass near TNP during their seasonal migration between summer and winter pastures.

Overall, livestock numbers in the villages near TNP have remained stable over the past five years, with no indication of future growth. These herds consist predominantly of household cattle that graze on communal pastures. From a veterinary perspective, cattle grazing on shared pasturelands are

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[3] Vetrinary Assessment Around Tbilisi National Park, Irakli Samkharadze, 2025

considered as one epidemiological unit, regardless of ownership. This is because they interact directly, use the same grazing areas, and share common water sources, which increases their susceptibility to a wide range of diseases, including those transmitted via contaminated water or infested soil. Examples include leptospirosis, anthrax, pasteurellosis, and foot-and-mouth disease.

It is important to note that, while the planned red deer release site will be located deeper inside the park, several communal pastures directly border TNP. This spatial overlap increases the potential risk of disease transmission between livestock and wild ungulates.

Livestock Migration

Traditional livestock migration routes pass relatively close to TNP, particularly in the Tianeti Municipality villages of Kvernaula and Akhalsopeli. The main risks associated with migrating livestock include:

- **Spread of infectious diseases** – Migration increases the risk of both direct-contact infections and soil-borne diseases such as anthrax, pasteurellosis, sheep pox, and other acute infections.
- **Role of vectors** – Diseases can also be transmitted by vectors (primarily insects and ticks), posing risks to both domestic and wild animals.
- **Interactions with wildlife** – During migration, contact with wild animals is possible, creating opportunities for mutual disease transmission and posing a threat to epizootic stability.

Risk Management

Management of risks associated with migrating livestock is generally carried out at the national level through a comprehensive approach that includes:

- Regular veterinary monitoring and vaccination;
- Establishment of veterinary checkpoints along migration routes;
- Awareness-raising among farmers and herders.

It is important to highlight that many of Georgia's protected areas lie along major livestock migration routes or contain grazing lands at either end of those routes. For instance:

- **Lagodekhi PA** (harbouring one of the two source populations of red deer) and **Tusheti PA** include extensive summer pastures;
- **Vashlovani National Park** encompasses large areas of winter grazing grounds;
- **Borjomi-Kharagauli NP** and several others contain communal pastures, where livestock grazing is recognised as a traditional form of land use.

In this regard, TNP is not different from other Georgian protected areas with respect to livestock grazing in its surroundings. However, unlike several other parks, TNP does not have officially designated pastures within its boundaries, even though communal and transhumant livestock grazing is a common practice in adjacent areas.

5.6.3 Recorded Diseases

In Georgia, laboratory testing of livestock diseases is conducted primarily within the framework of **passive surveillance**. When suspected cases arise—for example, an animal showing clinical signs of illness or a sudden death—a veterinarian from the National Food Agency (NFA) visits the site, assesses the condition, collects anamnesis data, and, if required, takes samples for laboratory analysis. These samples are then transported to the State Agricultural Laboratory for diagnostic confirmation.

Between 2020 and 2024, no laboratory-confirmed cases of high-risk zoonotic diseases (such as brucellosis, tuberculosis, or anthrax) were recorded in the villages adjacent to Tbilisi National Park. This suggests a state of epidemiological stability in the region.

With respect to endemic diseases—including Emphysematous carbuncle (emkar), pasteurellosis, and piroplasmosis—no samples were submitted to the laboratory from the target villages during the same period. At the municipal level, however, data from the three relevant municipalities (Mtskheta, Mtianeti, and Gardabani) show a marked decline in the number of samples submitted in 2024 compared to previous years. However, it is important to emphasize that underreporting remains a limitation: some farmers fail to notify veterinarians of livestock diseases. Therefore, the observed decline in sample submissions may not accurately reflect the true epidemiological situation.

5.6.4 Stray Dogs

Stray dogs are widespread across Georgia and represent a significant challenge from both an **epizootic** and **public health** perspective. These animals pose a substantial epidemiological risk, as they are typically unvaccinated, lack veterinary supervision, and may serve as reservoirs for infectious diseases, including zoonoses (diseases transmissible from animals to humans).

Stray dogs are potential carriers of rabies, leptospirosis, parasitic infections, and other pathogens that can spread to domestic animals, humans, and wildlife (including red deer). Because their movements are uncontrolled, they can come into direct or indirect contact with wild species, facilitating mutual disease transmission.

While the presence of stray dogs in human settlements surrounding TNP was expected—given their ubiquity in Georgia—wildlife surveys conducted in the park revealed a **substantial stray/feral dog population within TNP itself** (see Subchapter 7.4.3). These dogs appear to breed inside the park, although their numbers may also be reinforced by inflows from surrounding settlements, where they likely originated. The presence of a feral dog population of this scale in a protected wilderness area has not been observed elsewhere in the country. Interactions between feral dogs inside the park and stray dogs at nearby settlements almost certainly occur, creating additional pathways for disease transmission in both directions and ultimately to wild species. This situation poses a considerable threat to the health of TNP's wildlife populations, including the future red deer population.

Currently, veterinarians of the National Food Agency administer preventive rabies vaccinations only to dogs with identifiable owners or guardians (including communally owned dogs). Stray dogs, however, are excluded from vaccination campaigns. No official data exist on the number of stray

animals in the villages surrounding TNP, as no studies have been carried out to date. The Tianeti Municipality is preparing to launch a programme for the capture and sterilization/castration of 200 stray dogs, though this will initially cover only the town of Tianeti.

5.6.5 Legal Framework for Stray Dog Management

The newly adopted **Law on Domestic Animals** (July 2, 2025) represents an important step toward improving the welfare of domestic animals and regulating stray populations. Based on principles of humane treatment, the law establishes mechanisms for municipal-level implementation. Specifically, municipalities are now required to carry out measures for the control of stray animals, including: *"The authorized body of the municipality shall ensure the identification and registration, sterilization/castration, and anti-rabies vaccination of stray/unowned animals…" (Article 18, Paragraph 1)*

5.6.6 Preventive Vaccinations in Nearby Villages

In the villages adjacent to TNP, preventive vaccination campaigns are carried out annually under the State Veterinary Program. These campaigns aim to safeguard animal health and prevent the spread of infectious diseases. Vaccinations target both zoonotic diseases (transmissible to humans) and non-zoonotic diseases that, while not directly affecting humans, can spread rapidly within livestock populations and cause severe economic losses. Key diseases include:

- **Anthrax** – a highly lethal zoonotic infection, with spores that can persist in soil for decades, posing long-term risks.
- **Foot-and-mouth disease (FMD)** – a highly contagious viral infection affecting all even-toed ungulates (cattle, sheep, goats, pigs, deer, camels, etc.). Infection rates can reach 100% within a herd, with mortality of up to 20% in adult animals.
- **Sheep and goat pox** – a highly contagious disease transmitted primarily by direct contact, with elevated mortality rates.
- **Brucellosis** – a zoonotic infection affecting both animals and humans, with serious health and economic impacts.
- **Rabies** – a viral zoonotic disease affecting the central nervous system, invariably fatal if untreated in both humans and animals.

Vaccination coverage rates in the villages surrounding TNP average **80–85% of the total livestock population**, which is considered high by both national and international standards.

5.6.7 Veterinary Surveillance and Wildlife Populations, Including Red Deer

Although state veterinary surveillance in Georgia covers domestic animals through laboratory testing, vaccination programs, and response protocols, these mechanisms **do not extend to wildlife populations**, including red deer. Key limitations include:

- **Absence of wildlife health programs** – No targeted state program currently exists for monitoring the health of wild animal populations, including red deer. Consequently, the

prevalence and circulation of infectious or parasitic diseases among wild species in Georgia remain unknown.

- **Challenges of monitoring** – Wild animals in Georgia are highly elusive, and live individuals are rarely observed directly. This complicates both the early detection of diseases and the assessment of epizootic risks.
- **Lack of necropsy procedures** – There are no established procedures for sample collection or determination of cause of death when carcasses are found or when clinically suspicious animals are observed.

Given these limitations, there is a clear risk of **mutual disease transmission between domestic and wild animals**. Wild species can act as both hosts and vectors for pathogens common in domestic livestock, and *vice versa*. This risk is of particular concern in the context of red deer reintroduction.

5.6.8   Private Veterinary Services in Nearby Villages

Private veterinary services are available in the villages surrounding TNP, but several constraints affect both accessibility and response capacity:

- A veterinary clinic operates in **Mtskheta Municipality**, primarily focused on companion animals (dogs, cats), where it also provides sterilization–castration services. In addition, the *LEPL Zoological Center* contributes to homeless animal management, supporting municipal efforts.
- Veterinary services for **livestock** are available in adjacent villages. Most veterinarians are experienced professionals, but they often lack adequate diagnostic equipment. Consequently, diagnoses are generally based on clinical symptoms, which reduces accuracy and delays effective treatment.
- Farmers usually consult veterinarians only once clinical signs of disease are evident. This behavior is influenced by both limited awareness and socio-economic constraints.
- Cases of self-treatment are frequent: farmers purchase veterinary medicines directly from pharmacies, relying on advice from non-specialists or peers. Antibiotics are often used incorrectly, creating risks of antimicrobial resistance.

5.6.9   Key Gaps and Challenges in Relation to the Veterinary Situation Around TNP

- Low level of biosecurity on local livestock farms;
- Limited awareness among livestock keepers;
- Restricted access to quality veterinary services;
- Epidemiological risks linked to the use of common pastures;
- Risks associated with livestock migration routes;
- Unmanaged stray dog populations in villages and within TNP;
- Lack of veterinary surveillance and diagnostic capacity for wild animals.

5.6.10 Conclusions and Recommendations

Overall, the veterinary situation in the villages surrounding Tbilisi National Park (TNP) appears to create **favourable conditions for the reintroduction of red deer**. In recent years, no laboratory-confirmed cases of zoonotic or acute infectious diseases have been recorded in the area, indicating relative epidemiological stability.

However, the assessment also highlighted several systemic challenges that may pose risks if not addressed. These include insufficient technical capacity of private veterinary services, low awareness levels among farmers, unmanaged stray animal populations, and epizootic risks linked to the use of communal pastures.

Addressing these challenges through targeted interventions would strengthen veterinary oversight and provide a safer foundation for the successful reintroduction and long-term conservation of red deer in TNP.

Recommendations

- **Awareness and outreach** – Implement awareness-raising campaigns for communities in villages surrounding TNP to improve understanding of disease risks and prevention measures.
- **Capacity building for veterinarians** – Provide training to local private veterinarians and strengthen their diagnostic capacity through the provision of modern mobile diagnostic equipment.
- **Wildlife health monitoring** – For the post-release period, establish a pilot program for veterinary monitoring and epizootic surveillance of wild animals, with a focus on red deer. Based on international best practices, such a system should ensure timely veterinary examinations, differential diagnoses, laboratory testing, and rapid response measures. This model could later be scaled up to other protected and wildlife areas in Georgia.
- **Epidemiological studies** – Conduct research to identify and assess diseases circulating in existing wild red deer populations to better understand potential risks.
- **Stray dog management** – Carry out a comprehensive survey of stray dog populations in and around TNP and develop a management plan. This should include sterilization–castration campaigns aimed at reducing population size and associated disease risks.

5.7 Socio-economic situation in around the Tbilisi national park

5.7.1 Overall Socio-Economic Context

For the purpose of this document, local communities around Tbilisi National Park (TNP) are defined based on three criteria: (i) geographical proximity, (ii) socio-economic ties with the park, such as the use of its resources, and (iii) sensitivity to red deer restoration.

One way or another, the park's proximity directly shapes community life. Local residents rely on the park's natural resources—including water, firewood, mushrooms, and other non-timber products—to meet daily needs. At the same time, closeness to the capital, particularly in the Saguramo area, offers significant ecotourism potential. In contrast, infrastructural limitations in the Tianeti area severely constrain such opportunities.

Overall, areas bordering TNP present a diverse set of social, economic, and ecological characteristics—factors of critical importance for both park management and the reintroduction of red deer.

The summary below presents the socio-economic profile of the communities in and around TNP, based on a recent in-depth study[4]. It highlights aspects most relevant to red deer restoration and provides the basis for outreach, communication, and support strategies.

Communities around TNP vary in their socio-economic profiles but fall broadly into two main sectors:

1. **Tianeti Sector** – comprising three communities (Ghulelebi, Nakalakari, Sioni) with eight villages;
2. **Mtskheta Sector** – comprising three communities (Saguramo, Galavani, Tskhvarichamia) with twelve villages.

The Tianeti sector is characterized by a high dependence on livestock breeding and traditional agriculture, coupled with high rates of outmigration. In contrast, the Mtskheta sector has seen stronger private business activity, summer residences, construction, and service industries, creating a different socio-economic structure.

5.7.2 Socio-Economic Profile of the Two Major Sectors

I. **Tianeti Sector**: Characterized by heavy reliance on agriculture and livestock, significant dependence on social assistance, and remittances from family members working abroad. Some households also earn additional income from collecting and selling non-timber resources, particularly mushrooms. Development is hampered by poor infrastructure (lack of gas supply, inadequate water systems, poor road networks) and high emigration.

II. **Mtskheta Sector**: Owing to its proximity to Tbilisi, the area has experienced rapid development of summer and secondary residences. Large portions of land have been converted into seasonal or permanent homes for residents seeking to escape the city. This has radically reshaped local demographics and the economy: land prices have soared, traditional agriculture has declined, and employment has shifted to services and construction. These new settlers tend to value environmental quality and ecosystem services, often showing stronger support for conservation and infrastructure improvements—an important factor for future cooperation with TNP.

Use of Natural Resources

Natural resources remain vital for local communities. Many settlements depend directly on the park for drinking water, with headwaters located within its boundaries. In Tianeti, demand for firewood remains high, though the national introduction of the "business yards" timber supply system and

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[4] Socio-economic Assessment of the Surrounding Areas of the Tbilisi National Park, I. Kobulia, 2025 (in Georgian)

future gasification are expected to reduce this reliance. Among non-timber resources, mushrooms represent an especially important source of income.

Community Attitudes Toward the Park

Attitudes toward TNP have become noticeably more positive in recent years. While restrictions previously led to protests, there is now broad acceptance that the park provides important benefits. Survey results show that nearly 40% of residents view the park positively, while only a small share hold negative opinions. Focus groups revealed that dissatisfaction is mostly linked to firewood restrictions, though people generally recognize these as fair, and conflicts are now rare.

Community Attitudes Toward Red Deer Reintroduction

The reintroduction of red deer is widely supported. Nearly half of survey respondents expressed unconditional approval, with virtually no strong opposition. Focus group participants highlighted the aesthetic, cultural, and ecological value of bringing back deer, noting that it would "revitalize" the park and strengthen tourism. While direct economic benefits are not yet widely perceived, expectations exist for increased tourist flows and higher demand for local services. Concerns about potential poaching or minor conflicts with agriculture were mentioned only in isolated cases.

Local Communities and Tourism on TNP

Nature-based tourism remains poorly developed, particularly in Tianeti, where many residents are unaware of any tourism activity. In the Mtskheta sector, however, family guesthouses, rental cottages, and short-term tourism services are already emerging. The TNP management plan emphasizes the need to expand visitor infrastructure. Local residents generally view ecotourism as a promising opportunity and express willingness to participate, though they often lack information and skills.

5.7.3   Conclusions and Recommendations

Overall, community attitudes toward Tbilisi National Park (TNP) and the reintroduction of red deer are predominantly positive, creating highly favorable conditions for strengthening TNP's effectiveness and advancing rewilding efforts.

Relations between the park and local communities have improved significantly in recent years. Residents have largely come to terms with the restrictions and increasingly recognize the park's importance.

The main challenges remain rooted in poverty, youth migration, heavy dependence on firewood, and insufficient infrastructure. At the same time, opportunities related to ecotourism development, ecosystem service protection, and greater community involvement could strongly support red deer restoration and long-term conservation of the population.

Communities adjacent to the park are generally willing to engage in ecosystem restoration and ecotourism development—provided they see tangible benefits and maintain guaranteed access to essential resources. At this stage, red deer reintroduction is perceived not as a threat but as a promising opportunity.

Drawing on recent attitude surveys, focus group discussions, and analysis of secondary sources (including the TNP Management Plan), as well as the needs expressed by communities, the vision of park management, and relevant best practices, the following recommendations were developed. While some are specific to red deer restoration, others are broader in scope and extend beyond this plan.

Sustainable Resource Use

- Implement the "business yards" firewood model around the park.
- Prioritize the protection of drinking water sources, as most residents rely on them.

Support Ecotourism Development

- Develop visitor infrastructure (trails, visitor centers, picnic areas), especially in popular areas such as Sabaduri and Saguramo.
- Create ecotourism products, including nature trails and homestays (using red deer as a focal attraction).
- Engage local communities—especially youth—in tourism services through targeted training.

Social and Livelihood Support

- Launch programs to support youth development and involvement in tourism services.
- Promote small rural businesses (e.g., food, handicrafts, local products).
- Encourage sustainable harvesting of mushrooms and other non-timber products through market linkages.

Conservation Awareness

- Conduct awareness campaigns with the message: *"Red deer restoration means a healthier environment for all—not new restrictions."*

Strengthen Community Partnerships

- Establish regular dialogue platforms between park management and local communities.
- Provide training for local guides and involve residents in visitor services.
- Engage seasonal and permanent settlers from Tbilisi in environmental initiatives and park management.
- Involve communities in project planning, implementation, and decision-making to avoid conflicts stemming from misinformation or exclusion.

6 Reintroduction Strategy

Species reintroduction is a complex process that involves a variety of factors. It is not possible to predict everything, even with the best knowledge and experience. Therefore, this reintroduction plan will be constantly updated based on the results of each phase and emerging international knowledge.

6.1 Ungulate Reintroduction in Georgia: Insights for Tbilisi National Park Rewilding

The history of ungulate reintroduction in Georgia offers valuable lessons for the Tbilisi National Park (TNP) rewilding project, illustrating both the difficulties of captive breeding and the effectiveness of direct translocation.

The first attempt to reintroduce goitered gazelles (*Gazella subgutturosa*) took place in the late 1980s, when 10 individuals were brought from the Bukhara Breeding Centre in Uzbekistan to the Vashlovani Reserve in south-eastern Georgia (Mellone et al., 2012). All died within two years due to disease and wolf predation. This failure stemmed from major shortcomings, including a poorly designed enclosure that allowed predator access and its placement in unsuitable *Pistacia* woodland habitat, which favoured wolves and limited the gazelles' ability to escape.

A second attempt began in 2010, when 11 gazelles (nine females and two males) were translocated from the Ceylanpinar Breeding Centre in Turkey to a breeding enclosure in Vashlovani. This program also failed, with all individuals eventually lost due to a combination of factors: a severe winter, inbreeding within the stock, and insufficient natural forage in the enclosure (Mellone et al., 2012).

In 2004, the WWF Caucasus Programme Office launched a bezoar goat breeding initiative in Borjomi-Kharagauli Protected Areas (PA) (WWF Caucasus News, 2004). Wild individuals from Armenia were placed in an enclosure with the goal of establishing a breeding population for later release. However, similar to the gazelle projects, the enclosure location and design was inadequate, and the protected area administration lacked the capacity to sustain the program independently. The population collapsed, leaving only a single male, which was later transferred to Tbilisi Zoo.

One exception to the failed captive breeding attempts is Tbilisi Zoo's red deer program. Established in 2015 with two individuals (Gurielidze et al., 2015), the captive herd grew to 33 over a decade, supplemented by two animals from Baku Zoo and two from an Armenian breeding facility in Dilijan. Genetic assessment confirmed the stock as *Cervus elaphus maral*. Today, this population serves as the basis for a reintroduction program in Algeti National Park, jointly implemented by the Wildlife Agency and the Agency of Protected Areas, with funding from the Swedish International Development Cooperation Agency (SIDA). A large 60-hectare enclosure has been built in Algeti for breeding and restoration purposes, and several individuals have already been transferred from Tbilisi Zoo.

By contrast to earlier failed attempts to reintroduce gazelles, a highly successful model was developed for the goitered gazelle through direct translocation. Following a feasibility study in 2008, WWF Caucasus Programme Office Georgia reintroduced 257 wild gazelles from Shirvan National Park in Azerbaijan to the Ajinour steppe and Samukhi valley (Bitsadze et al., 2025). Using a "hard release" approach, the animals were released directly into the wild. Since 2019, the population has expanded rapidly. By autumn 2024, the Samukhi valley population was estimated at 400 individuals, and the

Ajinour steppe population at approximately 504 (Bitsadze et al., 2025). This success demonstrated the effectiveness of translocating wild individuals directly to suitable habitat, provided there is a strong source population and a skilled team to manage transport and release.

In summary, Georgia's experience shows that captive breeding programs for ungulates often failed due to insufficient expertise, inadequate facilities, and lack of long-term institutional commitment (e.g., goitered gazelle and bezoar goat). Successful breeding facilities require substantial budgets and long-term management, yet most efforts were short-lived and dependent on external donor support, with state agencies unable to sustain them independently.

Conversely, long-term investment and professional management enabled Tbilisi Zoo to establish a viable red deer breeding population, which may develop into one of the region's largest facilities. At the same time, the recent gazelle reintroduction in the Iori–Ajinour steppe highlights the advantages of hard release: wild individuals adapt readily to local conditions, survival rates are high, costs are lower compared to captive breeding, and founder populations can be established more quickly—an important asset in changing socio-political contexts.

6.2   General Approach

Drawing on the lessons outlined above, the restoration of the red deer population in Tbilisi National Park (TNP) will primarily rely on the translocation of wild red deer from a viable source population and their release into the protected area. This strategy is justified by three key factors:

– The presence of a viable source population (see next chapter).

– Translocation of wild individuals is significantly more cost-effective than maintaining a long-term captive-breeding program.

– Wild individuals generally have higher survival prospects and greater potential to establish a healthy founder population within a shorter timeframe.

This approach, however, does not exclude collaboration with the existing red deer captive-breeding program at Tbilisi Zoo on which the Algeti Red Deer Reintroduction program relies. Captive-bred individuals may be released together with wild-caught animals, thereby increasing the genetic variability of the founder population in TNP and reducing harvesting pressure on the source population. Comparable mixed-source strategies have been successfully employed in Italy, where reintroductions of chamois combined wild-caught individuals with animals from captive-breeding programs in park enclosures (Lovari et al., 2010; Bocci et al., 2016).

The Algeti Red Deer Reintroduction program could also benefit from this cooperation. Wild-caught individuals deemed unsuitable for release—such as very young animals or surplus males—could be transferred to the captive facility. This would both enhance the genetic diversity of the captive herd and potentially accelerate its breeding success.

6.3   Timeline and Phases

The reintroduction program will span approximately **five years** and will be implemented in three main phases:

1. **Preparatory Phase** (Year 1): Building institutional capacity at TNP, acquiring equipment, securing government permits, and constructing a temporary acclimatization facility.

2. **Translocation Phase** (Years 2–4): Annual capture and release of wild red deer into TNP.

3. **Post-Release Phase** (Years 2–5): Initiated after the first group is released, focusing on monitoring, evaluation, and adaptive management of the reintroduction effort (see subsequent chapters for details).

6.4   Translocation Numbers and Frequency

To establish a viable founder population, **15 individuals will be translocated annually over three consecutive years, for a minimum of 45 individuals in total**.

A population simulation conducted with VORTEX 10.8.1.0 evaluated multiple scenarios. The optimal scenario involved the release of **15 individuals with a 1:4 male-to-female sex ratio** in the first year, followed by two additional cohorts of **15 individuals each in subsequent years**. (Model assumptions included: 50% mortality for individuals under one year of age; 10% annual mortality for adults; 50% of adult females reproducing each year). Results indicated a **99.7% probability of success and only a 0.3% chance of extinction**. The population is projected to expand steadily, approaching the **estimated carrying capacity of ~1,200 individuals** within several decades.

6.5   Release Strategy: Hard vs. Soft

Reintroduction projects that rely on wild-caught individuals typically adopt a hard release approach, where animals are released directly into the wild with no transitional support. This method is logistically simple, cost-effective, and minimizes human contact, reducing habituation risks.

In contrast, a soft release involves holding animals in an acclimatization enclosure, with supplementary feeding, shelter, and gradual adaptation to natural conditions. While more costly and complex, soft release is often essential for captive-bred animals and can improve survival and site fidelity for wild-caught individuals as well.

Case studies suggest that temporary holding enclosures can reduce the homing effect (i.e., animals returning to their capture site), allow recovery from capture stress, and facilitate group cohesion—all of which improve survival prospects (Ryckman et al., 2010; Rosatte, 2013; Bleisch et al., 2017; Branislav et al., 2024). Prolonged enclosure holding has been linked to higher post-release survival rates. However, Cain III et al. (2018) found no difference between hard- and soft-released mule deer (Odocoileus hemionus), likely because the enclosure size (0.81 ha) and holding period (3 weeks) were insufficient compared to other successful efforts.

For TNP, while the project is fundamentally based on wild-caught animals (implying a hard release), **a delayed release strategy** will be applied. Individuals will be kept temporarily in an acclimatization enclosure until the full release group—15 animals with the proper sex ratio—is assembled. This approach provides time for rest and acclimatization, while also facilitating the release of cohesive groups rather than isolated individuals.

The enclosure will also enable integration of captive-bred animals from Tbilisi Zoo. These individuals will be introduced first, helping calm wild newcomers, promoting faster adaptation to enclosure conditions, and potentially encouraging bond formation. If a mixed group forms, they will be released together.

6.6 Acclimatization Enclosure

A one-hectare acclimatization enclosure will be established in TNP, equipped with:

- ✓ A reliable water supply.

- ✓ A designated hay-feeding area.

- ✓ Shelters and an artificial salt lick.

- ✓ Continuous surveillance via live cameras.

This facility will ensure animal welfare during the holding period and provide critical infrastructure for adaptive management.

6.7 Translocation Timeline

Best practice dictates that red deer should be captured in February–March, when cool temperatures minimize physical stress and the risk of capture myopathy. Conversely, heat and prolonged pursuit are known to exacerbate myopathy in wild ungulates.

Since red deer in Georgia typically calve in May–June, completing captures and transport well before late gestation will reduce risks of fatalities and handling complications.

After being held in the acclimatization enclosure, release groups will be freed into TNP in spring or early summer. This schedule provides released individuals with the entire summer and autumn to learn the new environment, establish home ranges, and prepare for the first winter.

Supplementary feeding during the initial winter may be provided if signs of malnutrition are detected among the released individuals.

6.8 Sources of Red Deer Individuals

The success of red deer reintroduction depends on a carefully designed sourcing strategy that minimizes risks to existing populations. A recent assessment identified two viable red deer populations in Georgia:

- **Lagodekhi Protected Areas** – estimated at 147 individuals (95% CI: 73–175), strongly connected to the Zakatala Reserve population in Azerbaijan (~400 individuals).

- **Borjomi-Kharagauli Protected Areas (BKhPA)** – estimated at 589–729 individuals.

Other smaller populations in Georgia are considered too small to allow removal of individuals without jeopardizing their long-term survival.

Given the endangered status and limited distribution of red deer in Georgia, planning the removal of individuals for reintroduction requires careful evaluation.

6.8.1   Population Viability Analysis of Borjomi-Kharagauli Population

In order to check whether the Borjomi-Kharagauli red deer population is strong enough to cope with such a loss of individuals for TNP rewilding, a **population viability analysis (PVA)** was carried out using specialized software (Vortex 10.8.1.0). A PVA is basically a long-term "stress test" for wildlife populations: it uses current population numbers, sex ratios, birth rates, and mortality rates to simulate how a population might grow or decline under different scenarios.

The lowest population estimate for Borjomi-Kharagauli (589 animals) was used in the simulation to be cautious. Also, the real-world sex ratio observed in autumn 2024 (1 male : 2.1 females) was applied, and natural survival and reproduction rates were included: about 75% of adult females give birth each year and roughly half of calves die in their first year, while adult mortality is about 10% annually.

The simulation was conducted for the following three **scenarios simulated (1000 iterations, 200 years):**

i.   Baseline scenario – no removals.
ii. Removal of 15 individuals per year (3 males, 12 females) for three consecutive years.
iii. Removal of 20 individuals per year (4 males, 16 females) for three consecutive years.

In all scenarios, **the BKhPA population continued to grow and reached carrying capacity (~1,300 individuals) within 30 years**. Thus, removal of **15–20 individuals annually over three years is sustainable and does not threaten the long-term viability of the population**.

While the **primary source** for translocation should be the robust Borjomi-Kharagauli Protected Areas (BKhPA) population, supplementing it with a small number of individuals from other sources would strengthen the genetic base of the founder population in Tbilisi National Park. For example, incorporating some individuals from the **Tbilisi Zoo captive-breeding facility** would enhance genetic diversity. Collaboration between the translocation project and the captive-breeding program could also be reciprocal: a limited number of wild-caught individuals may be transferred to the Algeti National Park facility to broaden its genetic pool and improve breeding outcomes.

6.8.2   Other sources

The **Lagodekhi population** represents another potential genetic source. As there has been no natural exchange between the Borjomi-Kharagauli and Lagodekhi populations for more than a century, their

genetic profiles may have diverged. Mixing individuals from both groups would therefore provide a particularly strong genetic foundation for re-establishing a viable red deer population in Tbilisi National Park.

Although the red deer population in Lagodekhi is relatively small, it is not isolated. It is supported by immigration from the adjacent **Zakatala Reserve** in Azerbaijan, while anecdotal reports suggest occasional movement of **Dagestani red deer** across the Georgia–Russia border into Lagodekhi PA. These transboundary linkages further strengthen its role as a supplementary source.

A population simulation assessing the removal of **five individuals** from Lagodekhi PA confirmed that such a harvest would not jeopardize the long-term viability of the population. In all tested scenarios, the population was projected to continue growing and to reach its carrying capacity of approximately **1,500 individuals** within two to three decades.

Thus, the Borjomi-Kharagauli population can safely provide the majority of individuals for reintroduction, while genetic enrichment from Lagodekhi-Zakatala transboundary population and Tbilisi Zoo captive breeding facility will strengthen the founding herd and improve long-term resilience.

6.9   Preparatory Phase

The preparatory phase is a critical foundation for the success of the TNP rewilding initiative. During this stage, all conditions must be created to ensure the smooth and effective implementation of the subsequent phases of red deer reintroduction. The preparatory phase is expected to last **up to one year** and must be completed before the end of the calendar year, as deer captures for translocation should begin in late January.

This phase will begin with establishing a strong **reintroduction team** with representatives from the Agency of Protected Areas, the Wildlife Agency, and Tbilisi Zoo.

Because the red deer is a protected species in Georgia, a special permit is required for its capture. A comprehensive justification for the reintroduction must therefore be presented to the Ministry of Environmental Protection and Agriculture (MoE), and authorization secured for the capture of the first 15 individuals.

Capacity-building activities in Tbilisi National Park with particular emphasis on anti-poaching measures and a carefully designed **communication campaign** targeting different stakeholder groups, especially hunters will be launched to secure public support. In parallel, a temporary acclimatization enclosure will be constructed within TNP, and all equipment required for the capture, transportation, and monitoring of deer will be procured.

Team building is one of the most crucial elements of this phase. The project will be led by a dedicated, multi-disciplinary team with clearly defined roles and responsibilities. The capture and handling of animals will be entrusted to a specialized **Translocation Team**, composed of professional rangers from Borjomi-Kharagauli Protected Areas, wildlife experts, and an experienced veterinarian. The veterinarian will oversee and administer all medical procedures, including tranquilization, stress reduction, and post-capture health checks. A separate unit, including specialists from Tbilisi Zoo with

extensive experience in large-animal translocation, will manage **the safe transportation** of captured individuals.

Procurement of equipment and supplies will be finalized well in advance of capture operations. The capture team must be provided with jab sticks, dart guns, immobilization drugs, and veterinary equipment for health monitoring. Custom-built transport crates will be designed specifically for red deer, ensuring safety through non-slip flooring and rounded edges. Telemetry collars and tracking equipment will be procured from certified manufacturers to guarantee reliable monitoring of released individuals. Ear tags will also be designed to ensure clear visual identification during post-release monitoring.

Potential **capture sites** will be identified and prepared ahead of time. Preference will be given to locations suitable for drop-net use, as this is considered a safe and efficient capture method. Such sites must be accessible by four-wheel-drive vehicles while still offering the quiet, undisturbed conditions needed for deer to approach. Artificial salt licks may be organised to attract deer to these areas, which will also be monitored with camera traps. To reduce avoidance behaviour, mock drop-net structures will be put out during the preparatory phase, allowing deer to gradually become accustomed to them.

A suitable site for the **acclimatization enclosure** will also be selected and constructed during this phase. Ideally, it should be located on relatively flat terrain to provide stability, situated away from human activity to minimize stress or habituation, yet remain accessible by vehicles. The enclosure should also be positioned in an area where the first groups of red deer are expected to establish home ranges, thereby easing the transition to the wild after release.

Finally, the preparatory phase will include targeted measures to address the problem of **stray and feral dogs** in Tbilisi National Park, as these pose a potential threat to reintroduced deer. A stakeholder workshop will be convened with representatives of animal welfare organizations, municipal authorities, and the Agency of Protected Areas to discuss and agree upon the most effective and broadly acceptable solutions. One long-term strategy under consideration is the capture, vaccination, and neutering of stray dogs, followed by their release into the same area. While such individuals would no longer breed, their presence would help prevent the influx of new, unsterilized dogs into the park ecosystem.

6.10 Translocation Phase

The translocation phase is one of the most critical stages of the reintroduction process, as it ultimately determines the success of the entire initiative. It involves the capture of wild red deer from the source population in Borjomi-Kharagauli Protected Areas (BKhPA), their transfer to the acclimatization enclosure built in Tbilisi National Park, a period of adjustment within the enclosure, and their eventual release into the wild. This phase will extend over approximately three years, with around fifteen individuals reintroduced annually into TNP.

The capture and handling of wild red deer represent the most sensitive and high-risk component of the operation, as it carries the greatest potential for stress, injury, or mortality. To minimize these risks, a detailed **capture protocol** will be developed in advance, and each member of the Capture Team will be thoroughly trained in their specific responsibilities.

Although several capture methods are available for wild ungulates, drop-nets will be the primary technique employed in BKhPA. Artificial salt licks will be organised at capture sites to attract deer, exploiting their natural craving for mineral salts, particularly in spring. Once a suitable group of red deer is gathered beneath the net, a remote trigger will release it, safely entangling the animals. Remote control of the system is essential, as it allows the team to avoid catching non-target species such as roe deer, and to selectively capture red deer of the desired age and sex.

Strict veterinary and handling procedures will be implemented to reduce stress and prevent capture myopathy (CM), a potentially fatal condition for which no cure exists. The key to prevention is minimizing stress at every stage of handling. Immediately after capture, each animal will be quickly restrained and blindfolded to calm it. A veterinarian will oversee all procedures, ensuring they are carried out efficiently and safely. Tranquilizing drugs will be administered in doses tailored to each individual's weight and age, and *Haloperidol* will be used to provide a calming effect lasting 24–48 hours, thereby reducing psychological stress during transport.

Throughout the process, vital parameters including temperature, heart rate, and breathing frequency will be closely monitored. Should complications arise, the veterinarian will respond immediately according to the immobilization protocol. Blood samples will be collected for biochemical, hematological, and genetic analysis, while each animal will be measured and weighed. For post-release monitoring, ear tags will be attached, and telemetry collars fitted, tested, and activated. Once the procedures are complete, the animals will be placed into custom-built transport crates designed for safety, with non-slip flooring and rounded edges. A 4x4 vehicle equipped with a liftgate or small hydraulic crane will be used to safely load the crates.

The journey from BKhPA to the acclimatization enclosure in TNP takes approximately two and a half hours. During transport, the veterinarian will check the animals' condition at least once and provide immediate care if any health issues arise.

Upon arrival, the crates will be placed inside the enclosure, allowing the animal to exit and begin exploring their new environment under the close supervision of the Translocation Team. The acclimatization period will give the animals time to rest, rehydrate, and adjust to their new surroundings. Release into the wild will only occur once the team is confident that the animals are healthy, well-bonded as a group, and sufficiently acclimated. Releasing them at this stage ensures they have ample time to familiarize themselves with their new habitat, establish home ranges, and prepare for the challenges of winter.

To build public awareness and support, the translocation phase will be accompanied by media coverage. Both the transfer of animals into the acclimatization enclosure and their subsequent release into the wild will be publicized through mass media, presenting the reintroduction project as a milestone in Georgia's conservation efforts.

6.11 Post-Release Phase

The post-release phase begins once the first group of red deer is released into Tbilisi National Park, starting in the second year of the reintroduction project. This stage is essential for assessing the success of the effort and ensuring the long-term establishment of a viable population. It includes tracking the movements of released animals with telemetry equipment and camera traps, evaluating

their adaptation to the new environment, investigating causes of mortality, monitoring population growth, and tracking predator dynamics within the release site.

A dedicated **Post-Release Team** will be established, bringing together park rangers, experts from relevant fields, and trained volunteers from the wider public. Among the many tasks of this phase, systematic monitoring of released individuals is the most critical, as it provides the evidence needed to determine whether the project is meeting its primary objective of establishing a free-ranging, self-sustaining red deer population.

Every released deer will be fitted with a telemetry collar. Ideally, a proportion of these collars will be equipped with GPS tracking systems for close monitoring of movement patterns. Depending on technical options and the project budget, these collars may use GPS/GSM, satellite, or UHF transmission. In cases where funding is limited, some animals may instead be fitted with simpler VHF radio transmitters, ensuring that the entire released group remains trackable. GPS collars will be programmed to record locations at frequent intervals—ideally every hour—to provide detailed movement data. This is particularly important for detecting homing behaviour, where animals attempt to return to their source population, and for monitoring the exact routes taken. Once the deer establish stable home ranges, the frequency of data collection can be remotely reduced to extend collar battery life and allow long-term tracking.

Telemetry devices will also include mortality sensors to alert the team immediately if a deer dies. Prompt detection is critical, as rapid recovery and examination of carcasses provide the best chance of identifying the cause of death. Necropsies will be conducted by a qualified veterinarian, and if the cause is not immediately apparent or a disease is suspected, biological samples will be sent to specialized laboratories. Where disease is confirmed, management actions such as vaccination of the remaining population may be implemented to prevent further losses.

Park rangers will play a central role in the monitoring process. The possibility of integrating the SMART (Spatial Monitoring and Reporting Tool) system—already used for anti-poaching in some Georgian parks —into red deer monitoring should be explored with the Agency of Protected Areas.

Alongside telemetry, camera traps will provide a complementary source of information. Shortly after release, remote cameras will be deployed across TNP to record the presence and behaviour of red deer. The Random Encounter Model (REM) will be applied to calculate deer density immediately after the release of the first 15 individuals. While the exact number of released animals will be known, using REM at this stage will allow the method to be calibrated, ensuring greater accuracy in future monitoring of the population. Camera traps will also supply qualitative data on deer behaviour, herd formation, social interactions, and reproduction. For example, the appearance of fawns on camera will serve as a key indicator of successful adaptation and breeding. Importantly, the combination of telemetry and camera traps will provide a holistic picture: GPS data will show *where* the animals are, while camera trap data will show *what* they are doing in those locations.

Camera trap data will also be used to monitor predator densities, including feral dogs, and to compare these values with the 2024 baseline (see subchapter 4.4). This comparison will highlight any changes in the abundance of key species and inform future management decisions.

Anti-poaching measures must be intensified during the post-release phase. Experience from other

reintroduction projects shows that poaching is among the greatest threats to reintroduced individuals (Rosatte, 2013; Torres et al., 2018). Accordingly, patrols in TNP should be increased and reinforced by a targeted public awareness campaign to minimize the risk of illegal hunting of the founder population.

Public participation will also be essential for ensuring the long-term success of the reintroduction. Local youth and students from nearby villages and universities will be encouraged to contribute to monitoring activities, such as tracking deer, deploying camera traps, and processing data. Veterinary students may assist with health checks and other animal management activities under the supervision of professional veterinarians, gaining valuable hands-on experience in wildlife management. Such engagement will not only build technical capacity but also foster a sense of ownership and stewardship among younger generations, strengthening support for the restored red deer population and helping secure its future in Tbilisi National Park.

7 Communication and Public Engagement

7.1 Strategic Context

The successful rewilding of Tbilisi National Park—specifically, the reintroduction of red deer and the long-term viability of the restored population—will depend heavily on public support and meaningful engagement at both local and national levels throughout every stage of the process. One of the most evident benefits is the potential to mitigate, or even eliminate, the constraints and threats facing the species, while simultaneously ensuring a healthier environment for all.

The red deer has long been an iconic species in Georgia, carrying strong symbolic and cultural significance. Nevertheless, it has become one of the rarest large mammals in the country, primarily due to excessive hunting. The communication programme for red deer restoration in TNP will build on existing public perceptions while positioning the species as a symbol of ecological restoration, rewilding, and sustainable eco-tourism. Its overarching goal is to foster understanding, acceptance, and active engagement among local communities as well as the broader public.

Restoring the red deer in TNP will contribute to ecosystem recovery, biodiversity enhancement, and the promotion of sustainable engagement with communities, youth, and visitors.

Park staff and rangers will serve as the programme's front-line ambassadors, playing a vital role in outreach as they interact directly with visitors, local communities, and media representatives.

7.2 Core components of communication strategy

1. **Stakeholder understanding**: PA staff, rangers, local communities, and educational institutions understand the scientific, ecological, and social rationale for restoration.
2. **Public awareness and acceptance**: Local communities and the general public support restoration efforts and develop positive attitudes toward coexistence with wildlife.
3. **Active participation:** Stakeholders are encouraged to engage through campaigns, education, and eco-tourism.
4. **Branding and promotion:** Red deer becomes a symbol of rewilding, ecosystem health, and national pride.

7.3 Implementation strategy

The communication programme will be carried out in three major phases, aligned with the implementation stages of the Red Deer Restoration Plan: (i) **Preparation Phase**, (ii) **Translocation Phase**, and (iii) **Post-release Phase**.

Each phase of the programme will have a distinct focus, adapting both its target audiences and key messages to match the specific objectives and needs of that stage in the restoration process.

The phases, their duration, and the corresponding objectives/themes of the communication programme are as follows:

	Key Theme / Focus	Duration
Phase 1	Awareness, acceptance, and community preparation	Year 1 and 2
Phase 2	Knowledge sharing, regional collaboration, and demonstration of feasibility.	Year 2 and 3
Phase 3	Branding, eco-tourism, public engagement, and sustainability.	Year 3 -5

7.4 The process

PHASE 1

Key focus: Awareness, acceptance, and community preparation

Specific Objectives of Phase 1:

1. Strengthen capacity of PA staff and rangers to communicate clearly, consistently, and positively about restoration.
2. Prepare local communities for red deer relocation by fostering positive attitudes, ownership, and understanding of ecological benefits.
3. Engage schools and youth to cultivate environmental stewardship and understanding of rewilding.
4. Disseminate **clear, attractive, and accessible messages** through media, printed materials, and interactive platforms.

Key Activities:

AUDIENCE	ACTIVITY	OBJECTIVE	COMMUNICATION / CHANNEL
PA ADMINISTRATION & RANGERS	Workshops on red deer ecology, habitat management, and monitoring	Build skills to communicate relocation positively to the public and stakeholders	Training workshops, communication manuals
PA ADMINISTRATION & RANGERS	Development of communication toolkit (FAQs, key messages, brochures, visual materials)	Ensure consistent, clear messaging across all staff	printed materials, handouts
LOCAL COMMUNITIES	Village meetings, focus groups, and interactive workshops	Foster positive attitudes toward red deer relocation, promote ownership, reduce potential conflicts	Community halls, interactive discussions, local radio
LOCAL COMMUNITIES	Distribution of printed materials: brochures, leaflets, posters, calendars	Explain ecological, cultural, and ecosystem benefits, reinforce positive attitudes	Community centers, local offices, events

LOCAL COMMUNITIES	Q&A sessions on human-wildlife interactions	Address concerns and encourage constructive involvement	Town halls, interactive discussions
LOCAL COMMUNITIES	Community participatory activities (e.g., habitat cleanup, tree planting, citizen science)	Increase sense of ownership and active participation	Local events, school-community collaboration, park visits
SCHOOLS / YOUTH	Environmental lessons on biodiversity and ecosystem restoration	Build environmental stewardship and understanding of rewilding	Classroom sessions, educational materials
SCHOOLS / YOUTH	Field trips to Tbilisi National Park / Junior Ranger programs	Provide experiential learning about wildlife and habitat	Guided park visits
SCHOOLS / YOUTH	Competitions (art, essays, videos)	Engage youth creatively and promote awareness	School exhibitions, social media
YOUTH UNIVERSITY STUDENTS, YOUNG PEOPLE)	Community Ranger Program: volunteer opportunities with park rangers (habitat surveys, awareness events)	Provide practical conservation skills and ownership of the red deer project	Fieldwork, mentorship by rangers, youth camps
GENERAL PUBLIC	Social media campaigns, videos, infographics	Build public awareness and interest	Facebook, Instagram, YouTube, project website
GENERAL PUBLIC	Live webcams of existing or relocating process of red deer	Provide interactive engagement and transparency	Online streaming, social media, park website
ALL AUDIENCES	Campaign "What Can I Do for Red Deer?" including donations	Encourage active participation and support for restoration	Social media, school campaigns, community events

PHASE 2

Key Focus: Showcase feasibility, strengthen regional collaboration, and demonstrate progress, promote collaboration at national and regional levels.

Specific Objectives of Phase 2:

- Share study results, lessons learned, and best practices.
- Strengthen partnerships with regional conservation organizations, scientists, and government stakeholders.
- Position Tbilisi NP as a leader in rewilding.
- Reinforce staff communication roles through advanced training and field practice.

Key Activities:

AUDIENCE	ACTIVITY	OBJECTIVE	COMMUNICATION / CHANNEL
PA STAFF & RANGERS	Advanced training in interpretation and eco-tourism communication	Equip staff to act as guides for red deer tours and interpretation	Training workshops, field-based practice
SCIENTISTS, NGOS, GOVERNMENT	Red Deer Regional Forum / Conference	Share lessons, best practices, and build partnerships	In-person conference, workshops
MEDIA / GENERAL PUBLIC	Publication of reports, press releases, documentaries	Disseminate progress and success stories	Print, online media, TV, social media
ALL AUDIENCES	Promotional printed materials (brochures, calendars, leaflets) updated with results	Keep audiences informed and engaged	Visitor centers, schools, events

PHASE 3

Key Focus: Establish red deer as a **national conservation brand**, integrate eco-tourism development, and ensure long-term community and institutional support.

Specific Objectives of Phase 3:

1. Establish red deer as a symbol of rewilding and ecosystem health.
2. Promote Tbilisi National Park as a sustainable eco-tourism destination.
3. Encourage public participation through campaigns, citizen science, and education.
4. Secure long-term policy, institutional, and community support.

Key Activities:

AUDIENCE	ACTIVITY	OBJECTIVE	COMMUNICATION / CHANNEL
GENERAL PUBLIC / TOURISTS	Red Deer branding: logo, merchandise, promotional materials	Establish red deer as a conservation and rewilding symbol	Visitor centers, online platforms, park signage
GENERAL PUBLIC / TOURISTS	Printed visual materials (brochures, leaflets, calendars, posters)	Enhance awareness and engagement	Park offices, eco-tourism centers, public events
TOURISTS / VISITORS	Guided eco-tours and "Red Deer Trails"	Promote eco-tourism and awareness	Guided tours, interpretive boards, brochures
GENERAL PUBLIC	Live webcams of relocated deer and its habitats	Engage broader audiences and show transparency	Online streaming, social media, park website
SCHOOLS / YOUTH	Educational programs, field trips, Junior ranger or Community Ranger programs	Foster long-term stewardship	Classroom sessions, park visits,
LOCAL COMMUNITIES	Participation in eco-tourism, festivals,	Encourage local ownership and sustainable involvement	Community events, workshops, festivals

GENERAL PUBLIC / ALL	Annual "Red Deer & Rewilding Festival"	Celebrate achievements and raise awareness	Park events, media coverage, social media, exhibitions
DECISION-MAKERS / GOVERNMENT	Policy briefs, official presentations	Secure long-term institutional and policy support	Meetings, presentations, publications
SCIENTISTS / EXPERTS	Long-term monitoring and research	Ensure evidence-based restoration and adaptive management	Field research, data sharing, publications
GENERAL PUBLIC / DONORS	"Adopt a Red Deer" donation campaigns	Raise funds and encourage participation	Social media, park website, community campaigns
MEDIA / NGOS	Media campaigns, documentaries, storytelling	Raise national and international awareness	TV, social media, online platforms

7.5   Campaigns and Engagement Initiatives

In addition to the three main phases with their tailored activities, four thematic campaigns and engagement initiatives will run throughout the red deer restoration process. These are designed to build momentum, foster participation, and create a strong sense of ownership among different groups:

1. **"What Can I Do for Red Deer?" Campaign** – A grassroots initiative to encourage community participation, habitat stewardship, citizen engagement, and local contributions.
2. **Donation Campaign: "Together for the Return of the Red Deer"** – This campaign will mobilize individuals, schools, businesses, and institutions to actively support the restoration of red deer in Tbilisi National Park. Through financial or in-kind contributions, every participant will become part of the rewilding journey—helping to bring back an iconic species, restore balance to ecosystems, and create a healthier environment for future generations.
3. **Red Deer Regional Forum / Conference** – A mid-term initiative designed to foster knowledge sharing, networking, and collaboration across the region, strengthening partnerships and amplifying the impact of restoration efforts.
4. **Annual Red Deer & Rewilding Festival** – A flagship public event that blends education, community engagement, eco-tourism promotion, and celebration of conservation achievements, making red deer restoration a shared success story.

8 Activity Plan for Red Deer Reintroduction in Tbilisi National Park

Phase I – Preparatory Phase (Year 1)

Objectives: Build institutional capacity, prepare infrastructure, and ensure conditions for safe reintroduction.

Key Activities

- Establish a **multidisciplinary implementation team** (APA, NACRES, Ilia State University, Wildlife Agency, Tbilisi Zoo).
- Secure **permits and agreements** with relevant ministries, APA, and source PA administrations.
- Conduct final **risk assessments** (veterinary, socio-economic, stray dogs, poaching threats).
- Procure essential **equipment** (GPS/VHF collars, camera traps, transport crates, veterinary kits).
- Construct and operationalize the **acclimatization enclosure** (~1 ha).
- Launch **training programs** for rangers in SMART patrolling, animal handling, and monitoring methods.
- Begin **awareness campaigns** with local communities ("What Can I Do for Red Deer?" initiative).

Milestones

- Acclimatization enclosure completed.
- All equipment procured and staff trained.
- SMART patrol system established, first communication campaign launched.

Phase II – Translocation Phase (Years 2–4)

Objectives: Capture, transport, and release founder populations into TNP, while building herd cohesion.

Key Activities

- Annual **capture operations** in Borjomi-Kharagauli PA (15–20 deer/year for three years).
- Limited extraction from Lagodekhi PA (~5 animals total across project).
- Integration of captive-bred individuals (Tbilisi Zoo, Algeti NP) to boost **genetic diversity**.
- Veterinary checks, ear-tagging, and fitting with telemetry collars.
- Staging in acclimatization enclosure for herd cohesion and stress reduction (**modified soft release**).
- Release into TNP with **community and media engagement events**.
- Parallel strengthening of **anti-poaching patrols** and stray dog management programs.

Milestones

- Year 2: First cohort of ~15 deer released; public event celebrates first release.
- Year 3: Second release completed; genetic diversity reinforced with Lagodekhi/captive-bred individuals.
- Year 4: Final release of ~15 animals; cumulative ~45–50 deer translocated into TNP.

Phase III – Post-Release Monitoring & Adaptive Management (Years 2–5)

Objectives: Track adaptation, survival, reproduction, and threats to ensure long-term establishment.

Key Activities

- **Telemetry monitoring** (GPS + VHF collars) and **camera trap network** operational.
- Conduct any **mortality investigations** (disease, predation, poaching).
- Monitor predator dynamics (wolves, jackals) and potential human–wildlife conflicts.
- Implement adaptive responses: veterinary interventions, patrol redeployments, community engagement.
- Annual **ecological and socio-economic reporting** shared with stakeholders.
- Host annual **Red Deer & Rewilding Festival** and mid-term **Regional Forum**.
- Develop a **long-term management plan** for sustaining the herd beyond Year 5.

Milestones

- Year 2: First survival and adaptation assessment completed.
- Year 3: First reproduction confirmed in TNP.
- Year 4: Independent evaluation of project progress and recommendations.
- Year 5: Viable, reproducing herd (~35–40 animals surviving, with fawns born in TNP).

End-of-Project Targets (Year 5)

- Establishment of a **self-sustaining red deer population** in TNP.
- Demonstrated **community support** through festivals, school programs, and citizen engagement.
- Strengthened **TNP management capacity** in monitoring, anti-poaching, and veterinary surveillance.

5-Year Gantt Chart for Red Deer Reintroduction Action Plan

Phase I
Phase II
Phase III

- Team establishment & permits
- Risk assessments
- Procurement & training
- Acclimatization enclosure
- Community campaigns
- Capture & release cohort 1
- Capture & release cohort 2
- Capture & release cohort 3
- Integrate captive-bred/other sources
- Anti-poaching & stray dog control
- Telemetry & camera monitoring
- Mortality & predator assessments
- Adaptive management actions
- Community events & festivals
- Independent evaluation
- Final viability assessment

Year 1 Year 2 Year 3 Year 4 Year 5

Project Year

65

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