ENHANCING FINANCIAL SUSTAINABILITY OF THE PROTECTED AREAS SYSTEM IN GEORGIA

TECHNICAL ASSISTANCE GRANT AGREEMENT

Monitoring of Short-listed Species Indicators in Selected Protected Areas in Georgia:

Bezoar goat (*Capra aegagrus*)

Final Report

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Any opinions, findings, conclusions, or recommendations presented in the report are those of the authors and do not reflect the views of Caucasus Nature Fund, its employees or its funders.

Photo on the cover: *Camera trap photo, WWF/NACRES*

Contents

Background

As part of the GEF/UNDP project "Enhancing financial sustainability of the Protected Areas (PA) system in Georgia" (the "GEF/UNDP Project"), in May 2020 CNF commissioned a Technical Assistance to provide ***technical support to prioritize biodiversity monitoring indicators (species and habitats) for 12 target PAs in Georgia to support the development of standardized PA-specific Management Effectiveness Assessment plans (Biodiversity Monitoring Indicators)*** with agreed monitoring methodologies for each prioritized indicator. As the result of the Technical Assistance, an agreed shortlist of fauna indicators was elaborated through an intensive and participatory process that involved all leading relevant experts and key stockholders, conducted in close cooperation with the main beneficiaries – the Agency of Protected Areas (APA) and the Ministry of Environmental Protection and Agriculture (MEPA).

The bezoar goat (*Capra aegagrus*) was selected as one of the high priority indicators for Tusheti and Pshav-Khevsureti PAs.

1 Introduction

NACRES carried out bezoar goat (*Capra aegagrus*) population surveys in Pshav-Khevsureti and Tusheti protected areas during spring and summer 2021 as part of the Technical Assistance Grant Agreement signed between CNF and NACRES on 21 February, 2021. We used *double observe count method* as a robust and scientifically acknowledged field method to assess the target populations in the two study areas.

This report describes the results of the bezoar goat surveys and their analysis.

2 Bezoar goats in Georgia

The bezoar goat has been a protected species in Georgia since 1982. It was included in the Georgian Red Data Book as species with a shrinking range and decreasing numbers (Kacharava et al., 1982). As of 2006, it is included in the Red List of Georgia as *Critically Endangered* (Government of Georgia 2014). Ilia state university reassessed the red list of Georgia in 2021 and they proposed to downgrade its status to *Endangered* (Kopaliani N and Gurielidze Z, 2021).

The historical range of the bezoar goat In Georgia covered not only the Tusheti and Khevsureti mountains on the northern slopes of the Greater Caucasus, but also parts of the Lesser Caucasus (Appendix #1). On the Lesser Caucasus, bezoar goats were found in Adjara Mountains as well as on the Meskheti ridge up to the town of Borjomi (Radde, 1899; Dinnik, 1914; Vereshchagin, 1959). The species disappeared from the Borjomi area at the beginning of 20th century (Geptner et al, 1961). According to Janashvili (1977), however, small groups remained there until 1970s. In early 1980s, 65 individuals were counted in the eastern part of Adjara mountains – Arsiani ridge (Arabuli, 1985). In 2002 and 2006-2007, no sign of bezoar goat presence was detected during brief surveys conducted on the Lesser Caucasus (NACRES unpublished data; Gavashelishvili, 2009). However, locals saw a male individual near village Khichauri, Adjara, in January 2020 (Adjara TV News, 2020). Most likely, the male moved from Turkey during the rut season.

The Lagodekhi PAs administration reported the sighting of male bezoar goats in the PA. They obtained cameras trap photos in the Kabali and Lagodekhi gorges of that PA. Two males were first recorded during the period from the end of 2016 and the beginning of 2017. The two bezoar goats probably came from Dagestan during the rut season. Bezoar goats reappeared in Lagodekhi in spring 2021 (photo #1). However, none of those individuals stayed long in Lagodekhi and apparently went back to Dagestan.

Photo #1 Bezoar goat in Lagodekhi PAs

At present, bezoar goat populations in Georgia remain only in the northern part of the Greater Caucasus, in the mountains of Tusheti and northern Khevsureti (Appendix #2).

3 Methodology

According to the original proposal we intended to carry out bezoar goat counts from the same observation points that we used in autumn 2020. The outcome of the census would be a minimum population size. However, following the advice of Dr Tanya Rosen, CNF, we decided to modify our approach and use *the double observer point count method*, which would enable us to estimate the true population size. We could still use the same observation points, but the observations were to be conducted by two observers independently for subsequent comparison. Any difference in the observation results would enable the calculation of the detection probability and finally that of a total population number. The method had been successfully used in Iran and Armenia and we decided to test it in Georgia too.

We largely followed *Guidelines of Ungulates Monitoring in Iran – Technical report* (Lukas Egli et al, 2017). However, we had to make some adaptations: the guidelines suggested to have circular observation points within the habitat of the target species and to set the maximum observation distance at 1,000 m. However, we had to have a longer observation distance; from our observation points it was possible to observe bezoar goats only on the opposite slopes. Because these animals are very shy in Georgia and walking into the bezoar goat range would inevitably disturb them and

eventually lead to the underestimation of the population. Therefore, our observation distance often was 2000 m or even longer.

We developed a new field form (see appendix 3) and had a short training for the field team to ensure that everybody understood all the key requirements of the methodology. We carried out observations in early morning, just after sunrise or in late evening 2 hours before sundown. Each observer made an independent 15 minutes-observation four times. We recoded bezoar goat locations and sex and age composition of the observed group. The observers discussed their independent observations, comparing their results at the end of the observation session.

The data were subsequently sorted and analyzed at the office. The average group size was calculated based on the field data sheets. We developed a matrix according to the above guideline (Egli L. et al, 2017) and analyzed it using the free software *Dobserv*. This software is often used to analyze point count data to calculate detection probability and abundance. To calculate bezoar goats on the surveyed areas, we multiplied the results by the average bezoar goat group size (Egli L. et al, 2017).

We used *Arc GIS* and based on the Digital Elevation Model (DEM) to carry out so called viewshed analysis and identify areas where the bezoar goat groups were counted. Viewshed analysis allow to identify the areas that were visible from particular observation points and hence, identify areas over which the observation data could be extrapolated. We finally estimated the population number by multiplying the density by the bezoar goat range area.

4 Preparatory work

The double observer method was new to the NACRES team. We had to carefully review all the available literature and also had additional communication (a Zoom meeting) with Dr. Arash Ghoddousi, a co-author of the technical report who kindly clarified all the questions we had about using the method in practice.

We had a short meeting with the new director of Pshav-Khevsureti PA, Mr. David Kobakhidze and the natural resources specialist Mrs. Nazi Razhamashvili in Dusheti where the PA administration is temporarily based. We discussed our work as well as biodiversity indicators selected for Pshav-Khevsureti PA. We also briefly discussed the new method that we were going to use in Pshav-Khevsureti to count bezoar goats. Mrs Nazi Razhamashvili mentioned that their rangers had a good knowledge of the bezoar goat groups within the PA and she was sure that the numbers they came up with last year were accurate. We agreed that the rangers would join us in the field and help us locate bezoar goat groups or specific observation points.

5 Bezoar goat survey in Pshav-Kevsureti protected areas

5.1 Data collection

The plan was to begin the fieldwork on May 20th, but the road to village Shatili was closed due to a large rock fall. We went to Khevsureti on May 27th 2021 as soon as the road was opened. We organised a base at Shatili. The first day of the fieldwork was dedicated to training and testing of the new field method – we counted bezoar goats from a preliminarily determined location using the *double*

observer approach under the direct supervision of Dr Tanya Rosen. Later, we had a meeting with the PA director and rangers. We shared our plans and agreed on bezoar goat observation points on the map. Most of the points were the same as we used in previous counts, but we also added new observation points. We also elaborated a detailed field plan and agreed to set up mixed teams – one ranger and at least one NACRES team member. We began data collection the next day.

We counted bezoar goats from a total of 17 observation points (see appendix #4). The weather was not favourable during the fieldwork. Sometimes, heavy rain and mist made observations impossible and we had to repeat observation sessions. We even had to temporarily suspend the observations and only resume them when the weather conditions improved. Therefore, the fieldwork to count bezoar goats in Pshav-Khevsireti took longer than planned.

5.2 Results

5.2.1 The size and sex/age composition of observed bezoar goat groups

During the spring counts we had an overall impression that we were seeing fewer bezoar goats as compared to the previous assessment that we conducted in autumn 2020. Out of the total of 17 observation points, we were able to actually observe bezoar goats only from 8 points i.e. 9 observation points yielded zero number of counted animals. All the observed groups of bezoar goats were mapped (Appendix #5).

We did not record any females with kids, which indicated that there was a delayed birth time.

As much as 80% of our observations were small groups of two individuals or just a single individual. A large group of males consisting of 20 individuals was seen only once in the Shatilistskali gorge, very close to the Russian border. Groups of more than 2 individuals (namely of 3, 4 and 9) were very rare.

We observed the following group compositions: small female group (the most frequently observed group type), males (two observations), and mixed male-female group (one observation).

The sex ratio in our observation data is 1 female per 1,4 male. We speculate that the females were less mobile during the observations and therefore less visible.

The average bezoar goat group size was 2.96 individuals. This figure was used to calculate bezoar goat numbers in Khevsureti.

5.2.2 Population numbers

We directly observed minimum 42 individuals during the spring counts. Based on the field data we developed matrix in Notepad as ASCII extension file and ran it through the Dobserv software. The result was 16.53 individuals. We multiplied this result by the average group size − 2.96 individuals in order to estimate the total population and the final result was 49 bezoar goats on the surveyed areas. We calculated the total surveyed area through the viewshed[1] analysis and found that the total area directly studied during our observations in Khevsureti was about 17 km^2. Hence, the bezoar goat density was 2.9 individual per km^2.

Based on the new field data we elaborated a bezoar goat distribution map with core areas of its range in Khevsureti (Appendix #6). The core areas cover all sections where bezoar goats are regularly

[1] I.e. the area that is visible from a given location (in this case bezoar goat observation point)

observed and it excludes areas that lack bezoar goat primary habitats. Of course, bezoar goats may be seen in other parts of Khevsureti too i.e. outside the core areas where they permanently live. Despite preliminary reports, no individuals were detected near village Khakhabo during this or earlier study that was conducted in autumn 2020. Hence the Khakhabo area was not included in the distribution map as a core area. Total area of bezoar goat habitat in Khevsureti is about 39 km^2. Using the above density (2.9 individual per km^2) the total population of bezoar goat in Khevsureti is ***114 individuals***.

6 Bezoar goat count in Tusheti protected areas

6.1 Data collection

The bezoar goat survey in Tusheti began on July 15, much later than we originally planned. This was due to the delay of the Khevsureti survey, which affected the preparation for the Tusheti trip. We remained in Tusheti as along as the observation required, 18 days in total. The NACRES filed team members consisted of Joni Kevlishvili, Teimuraz Popiashvili, Ivane Skhirtladze, Zviad Khutsishvili and Bejan Lortkipanidze and they were aslo accompanied by Giorgi Arabuli and Tanya Rosen from CNF.

Shortly after arrival in Tusheti, we had a meeting with the Tusheti PA director, Vakhtang Giunaidze and Head of Ranger Service, Onise Ichirauli. They noted that park rangers had been seeing small bezoar goat groups near the ranger station at the confluence of the Chanchakhovani and Alatovani rivers. We decided to include that site to our study area as an additional observation point. We also decided to collect data from the Ortskali valley. According to Onise Ichirauli, several bezoar goat groups had been seen in that valley.

We counted bezoar goats from 13 observation points (Appendix #7). Rangers participated in the observations around Omalo village. We visited Ortskali valley twice. During the first visit, heavy rain made it impossible to observe the animals, while according to local herders they were regularly seeing them on the opposite slopes. So, we went back to the site later and we recorded small groups of bezoar goat. No animals were observed near the ranger station at the confluence of the Chanchakhovani and Alatovani rivers. It is possible that they appear on those slopes later in the year i.e. in autumn. The site is very close to the areas where we recorded bezoar goats in the Ortskali river gorge and it is probable that it is used by the same animals.

It is important to note that the average observation distance in Tusheti was longer than that in Khevsureti. In some cases we had to observe the animals from more than 2000 m away. The obtained observation data were sorted and analysed back at the office.

6.2 Results

6.2.1 The size and sex/age composition of observed tur groups

Similar to Khevsureti, we mostly observed smaller groups of bezoar goats in Tusheti. Slightly more than half (51%) of all observed groups were single females with kids, while groups consisting of only two individuals were also common. The largest group was 6 females with 6 kids. We observed very few males. Most of them were young individuals in small groups or in mix groups with females. The

average group size was 1.93 individuals. This number was used in population size calculations. Based on the observed independent groups the male to female ratio was 1: 6.

We observed the following group compositions: female with kids, all female groups, young male groups and mixed groups - young males, female(s) and kids. (see Appendix #8 for the locations of the observed groups).

6.2.2 Population size

We observed a total of minimum 49 individuals. Field data were transformed into a relevant matrix and run it through Dobserv software. The result was multiplied by the average groups size in Tusheti i.e. 1.93 individuals and to the total population size was calculated which was 120 individuals for all the surveyed area. We ran the viewshed analysis[2] in order to estimate the total observed area, which was26 km^2. Hence, the bezoar goat density in Tusheti was 4.6 individuals per km^2.

We updated the bezoar goat range map in Tusheti based on the new field data by outlining all areas where bezoar goats are frequently observed (Appendix #9). According to the updated map the total range of bezoar goats in Tusheti covers 79 km^2. Using the above species density we estimate the total bezoar goat population in Tusheti at ***363 individuals.***

7 Discussion

7.1 Bezoar goats in Pshav-Khevsureti PA

As mentioned, we mostly saw small groups in Khevsureti. In addition, no animals were observed from a number of observation points. Despite the fact that the overall survey effort was higher this time as compared with the previous assessment, the minimum number of individuals that were counted during this assessment was 42 which is slightly less than the previous estimate – 59 individuals counted in autumn 2020. Among other things, this difference may be associated with seasonal variations; Notably While bezoar goats normally give birth in May, this period may shift depending on the start time and duration of the preceding mating season (Ekvtimishvili, 1954). We did not observe females with kids, which was probably due to the fact that the active birth period was still underway and females were remaining in secluded areas to give birth. Hence, we were unable to observe a proportion of the population that would be visible in autumn. The period from May to early June probably is not the best time to assess the bezoar goat population in Pshav-Khevsureti protected areas when using direct observation methods and it may lead significant underestimation of the populations.

The earlier bezoar goat counts in Pirikita Khevsureti were conducted by NACRES in 2012, during which only 20 individuals were counted (NACRES, 2012). The following year we carried out another counts and estimate the total population at about 40-50 individuals (NACRES reports 2013). The current estimate is 114 individuals indicating a positive trend since 2013. In addition to an increase in numbers we also noted range expansion; We recorded bezoar goats in completely new areas such as slopes along the main road to Shatili village where no animals were sighted during the earlier surveys in 2012-2013.

[2] I.e. the area that is visible from a given location (in this case bezoar goat observation point)

7.2 Bezoar goats in Tusheti PAs

We mostly observed females with young and very small groups (two individuals) and the average group size was significantly smaller than in 2010 and 2011 (1.93 and 4.5/4.6 respectively). It has been shown that the average group size in wild goats tends to be larger when density is high (Edge & Olson-Edge, 1990). However, some researchers also suggest that wild goat group size is related to current hunting pressures. Small group size may be an advantage against hunting as small groups are more difficult to spot (Bakhtiev, 1989; Weinberg, 1999). We speculate that both the visibility and group size of bezoar goats in Tusheti might have been affected by a combination of such disturbing factors as poaching, sheep grazing and mass tourism near the bezoar goat habitat. Overall, s**maller group size may be an indication of increased human pressure on bezoar goat populations.**

Over the past decades, data on the numbers of the Tusheti bezoar goat population are available from the end of 1980s, according to which there were 100-120 individuals in the Tusheti State Nature Reserve (Chikovani et al. 1990). In 1990s, there were not more than 100 individuals (Country Study Report 1996). In subsequent years, the population apparently slightly recovered (NACRES, 2004, Mellon et al 2007). In 2010 and 2011 the estimates were 130 individuals and 180 individuals respectively (NACRES, 2010 and Lortkipanidze, et al. unpublished data). According to an assessment conducted in 2012 there were 150-200 individuals (Ilia state university, 2012), while in 2013 the same team, using the distance-sampling method, came up with 310 individuals (224 – 431 95% CI) (Ilia state university, 2013). Our result from the July 2021 survey was 363 individuals. This is slightly higher than the 2013 estimate by Ilia State University but it *does* fit in the specified confidence interval. Since 1980s, different researchers have been using different approaches and field methods for the assessment of the Tusheti bezoar goat population in different years. Therefore, it is difficult to compare the available results. Nevertheless, considering all the above, the Tusheti bezoar goat population should be classified as ***stable low***.

Table 1. Bezoar goat assessment results in Tusheti from 1980s till present.

Source / research team and year	**Population numbers (adult individuals)**	**Comments**
End of 1980s; Chikovani *et.al*. (1990).	Approximatyely 100-120	Study area was confine to then Tusheti State Nature Reserve.
1990s; Georgian Country Study Report 1996.	≤ 100	
2004-2007 NACRES, 2004; Mellon et al 2007).	125	
2010 NACRES, 2010	130	Applied field technique: Direct counts
2011; Lortkipanidze, et al. unpublished data	180	Applied field technique: Direct counts
2012 Ilia State University (2012)	150-200	
2013 წ. Ilia State University (2013)	310	224 – 431 95% CI

		Applied field technique: distance sampling.
2021 წ. NACRES This report.	363	Applied field technique: double observer counts

7.3 Threats to bezoar goat populations on the Greater Caucasus

Based on our random interviews with local population as well according to the repots of rare visitors to Tusheti during the winter months (that is off normal tourist season) we **believe that the most severe factor limiting the bezoar goat population in both protected areas is poaching**. Hunters target bezoar goats mostly from late autumn through the end of the winter, during which time less people (tourists, local population) are present both in Khevsureti and Tusheti, hence there is weaker protection and less interference from potential witnesses.

In addition, bezoar goat habitats are typically rather near human settlements and the animals sometimes have to share pastures with sheep and cattle. Bezoar goats may be disturbed by the presence of livestock as well as their herders and livestock guarding dogs. The animals may be forced to avoid human dominated areas and become confined to less favourable sections of the habitat. Livestock is also a potential source of diseases and Tusheti and Khevsureti administration should closely monitor the health condition of livestock that graze on their respective territories to prevent as much as possible the transmission of any diseases to the wild populations.

Hiking tourism should not negatively influence the bezoar goat population in Tusheti and Khevsureti. None of the visitor trails crosses through important bezoar goat habitats. **However, fireworks that are sometimes organised by local hotels and guesthouses in Tusheti to amuse their guests as well as loud music local during traditional festivals or other getherings might also disturb bezoar goats in Tusheti.**

8 Bezoar goat population numbers in Georgia

Arabuli (1985) estimated the total national population at about 300 in early 1980s while assessing the bezoar goat populations in Tusheti, Khevsureti and in Adjara. Presently, bezoar goats are believed to be virtually extinct in Adjara. Based on Ilia state university assessment in Tusheti (Ilia state University 2013) and that by NACRES in Khevsureti (NACRES 2013), we can estimate the Georgian bezoar goat population at 350 individuals by 2013. According to the current assessment, the total number of bezoar goats in Georgia i.e. Tusheti and Khevsureti populations combined, is 477 individuals, which means that the population has somewhat increased in the past years.

9 Recommendations

- Carry out bezoar goat assessment in late autumn in Tusheti and Khevsureti using the *double observer approach* in 2024 and subsequently continue to monitor the population every 3

years (despite suggestions by some authors, we recommend against doing two separate surveys one in autumn and the other in spring as the latter may lead to severe underestimation of the population numbers)

- Increase the general anti-poaching capacity of both Tusheti and Pshav-Khevsureti PAs and intencify law enforcmnet measures especially during late autumn and winter months.
- Institute a local livestock health monitoring plan within the protected areas to minimize risk of transmitting diseases from livestock to wildlife.

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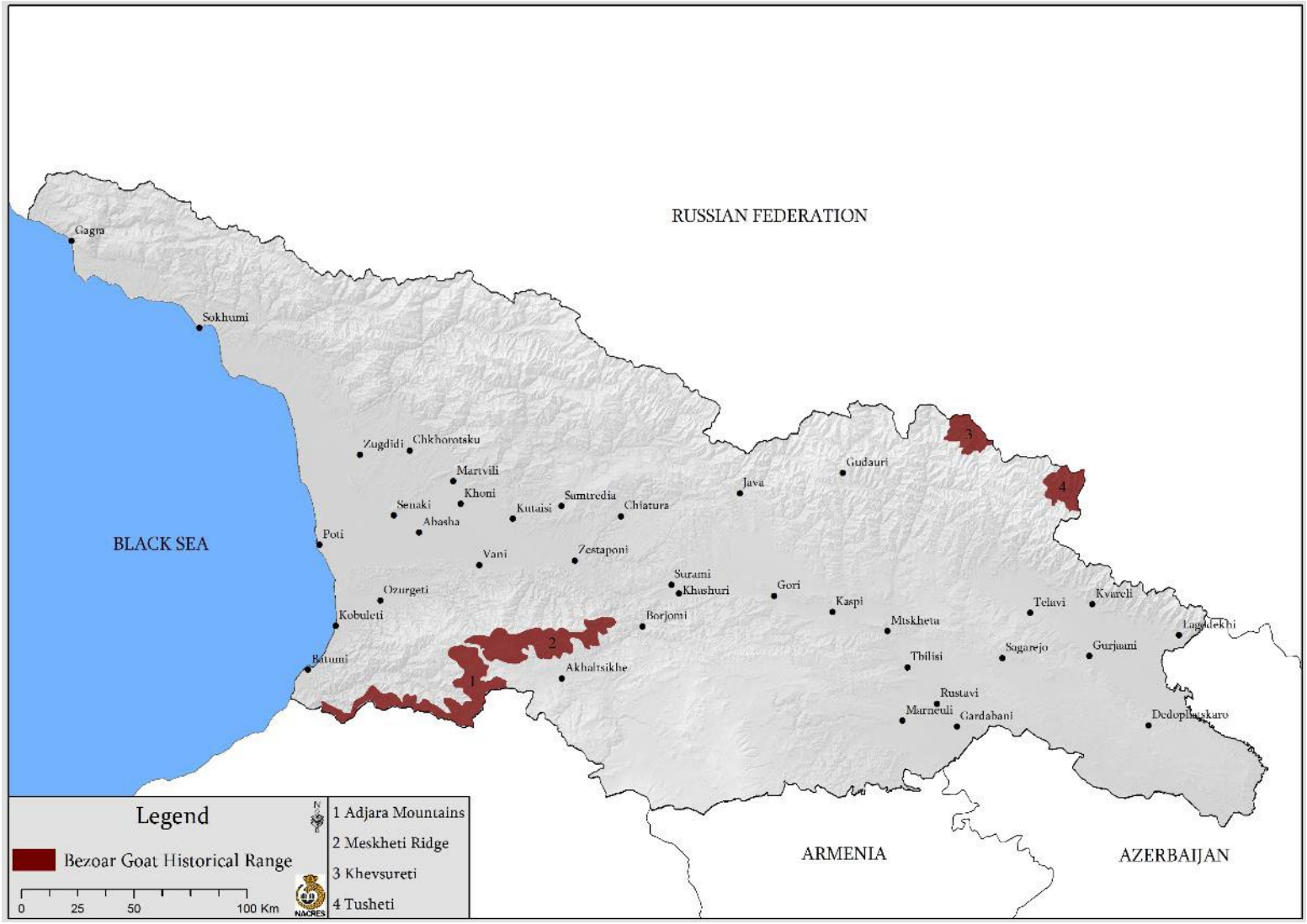
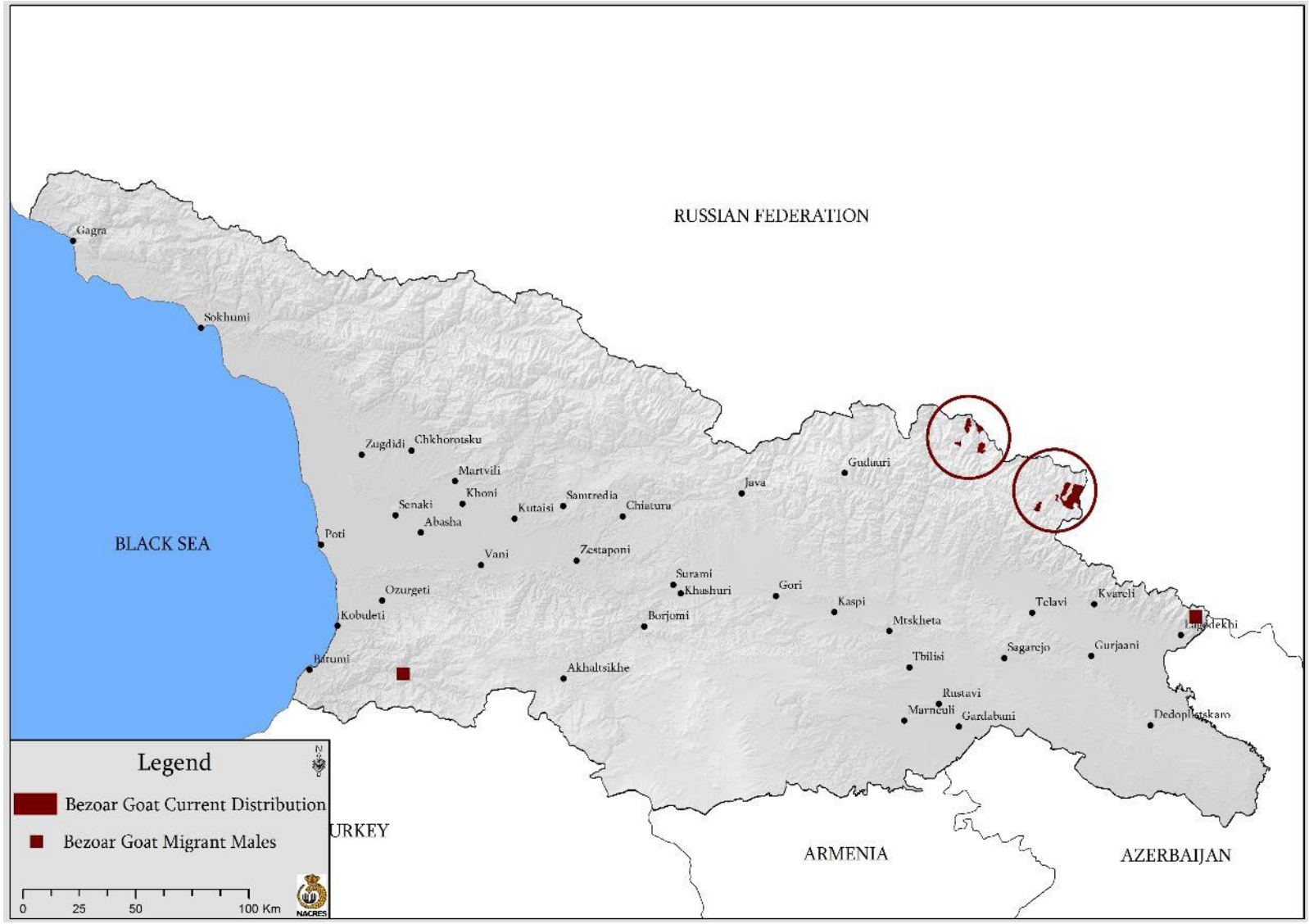
A P P E N D I C E S

Appendix #1 The historical distribution of bezoar goat in Georgia



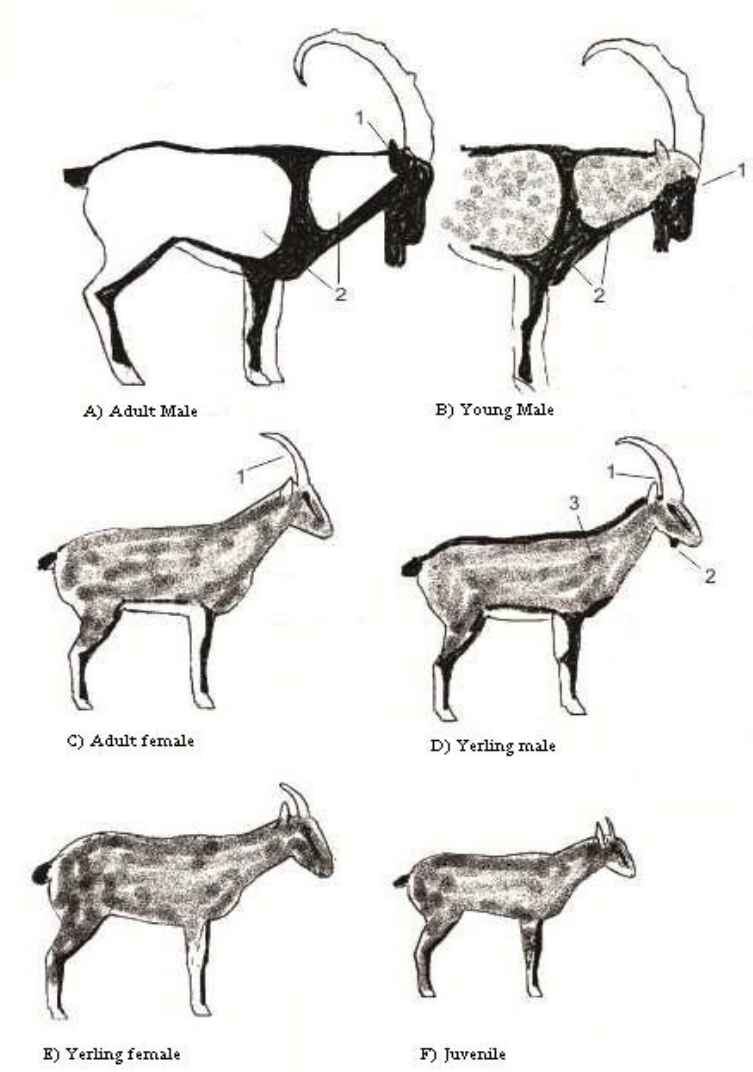
Appendix #2 Current distribution of the bezoar goat in Georgia



Appendix #3. Field data form for bezoar goat count

Date	Weather	Place name	Pint #	Observer's name
I obs. start time 17:25	**II obs. start time** 17:55	**III obs. start time**	**IV obs. start time** 18:55	**Second observer name**
I obs. end time	**II obs. end time**	**III obs. end time**	**IV obs. end time**	**Observation distance mean**
Coordinates		**X**		**Y**

# observation	**Exact time of animal detection**	**Altitudinal zone** F: forest A: subalpine-alpine	**Surface type** **S: scree** **C: cliffs** **SM: smooth**	**Exposure** (In degree)	Distance till the group	Adult Male (6 year and older)	Male 4-6 year old	2-3 year old male	1 year old male	Adult female	1 year female	yearling	**Unknown**	**Total**



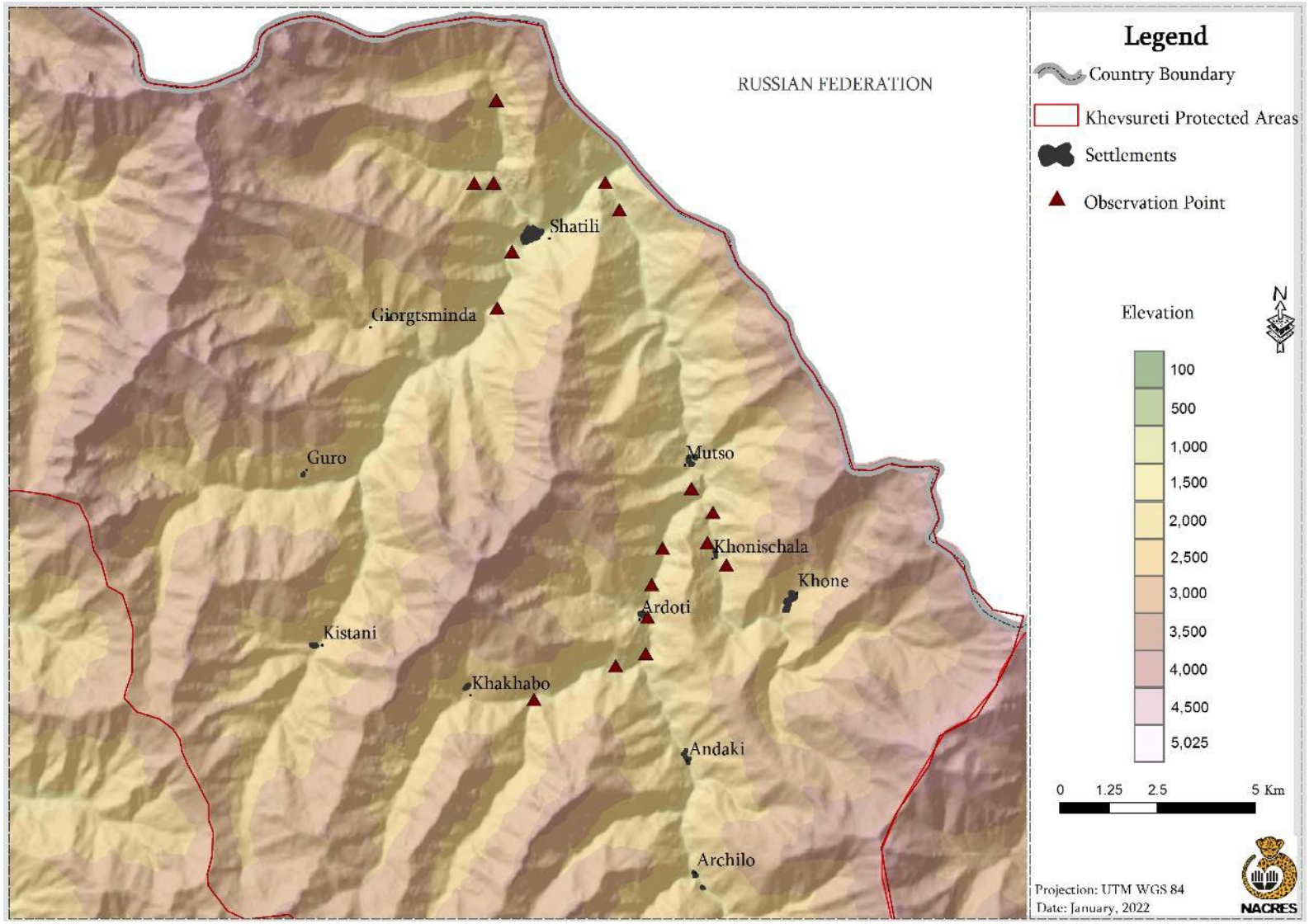
A) Adult male (≥ 5-6 years). (1) Head wholly black. (2) Body color is white or silvery, or silvery grey. Male body has black stripes.

B) Young male (2-5 years). (1) Head is not completely black, have beard; (2) Body color is mostly brownish and just turning grey. It has dark stipes along the body.

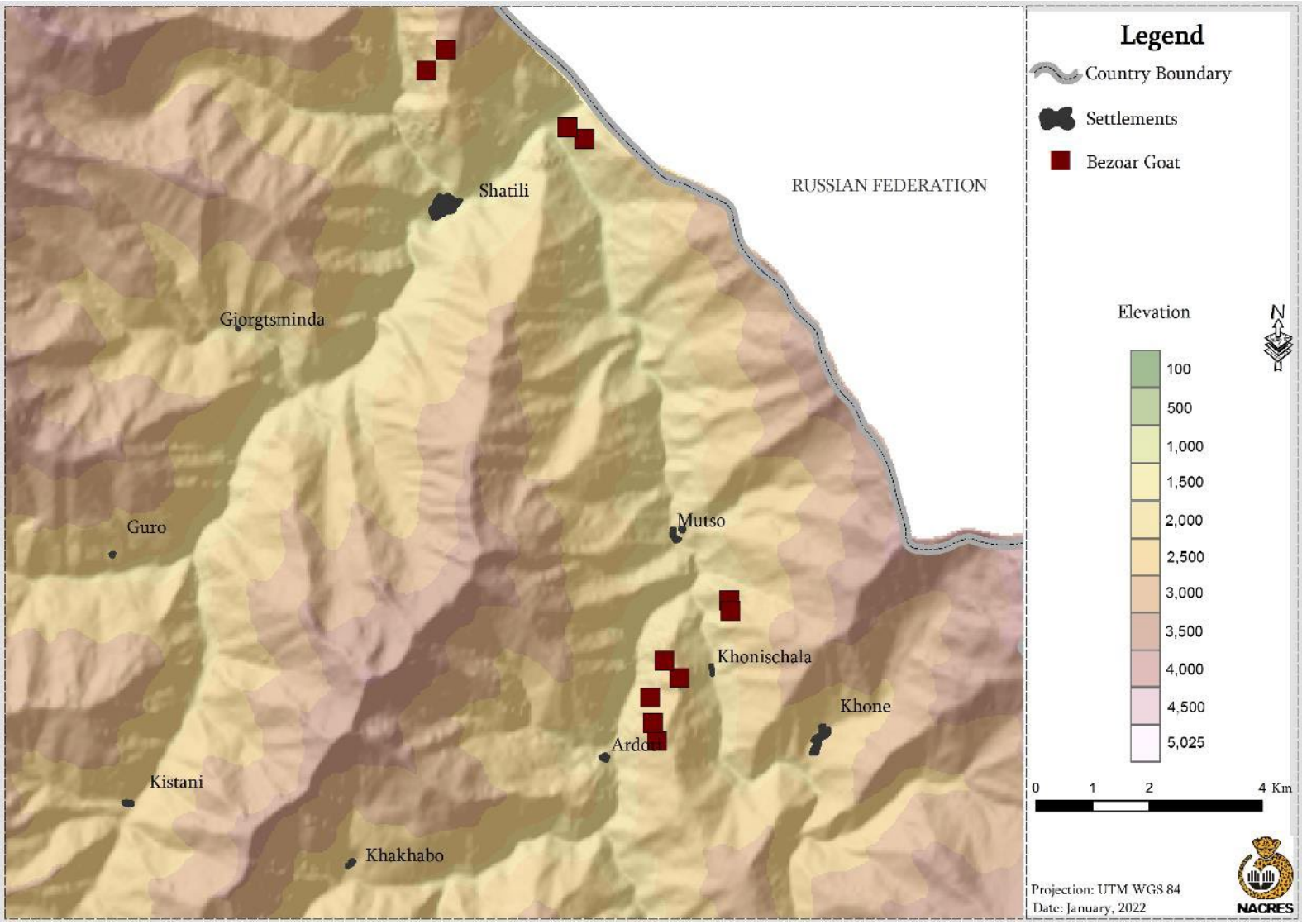
B) Adult female. Females are brownish with thin spiky horns (1) considerably longer than the ears and no beard. They have a stripe masking the eyes, a stripe separating white belly from brown sides and back, and a stripe along the spine.

C) Yearling male. Yearling males are about the size of a female (1) their horn size are the same length as those of females, but are noticeably broader at the base; (2) may have a vestige of a beard; (3) display the same pattern of stripes but have a greyish tinge to their upper parts.

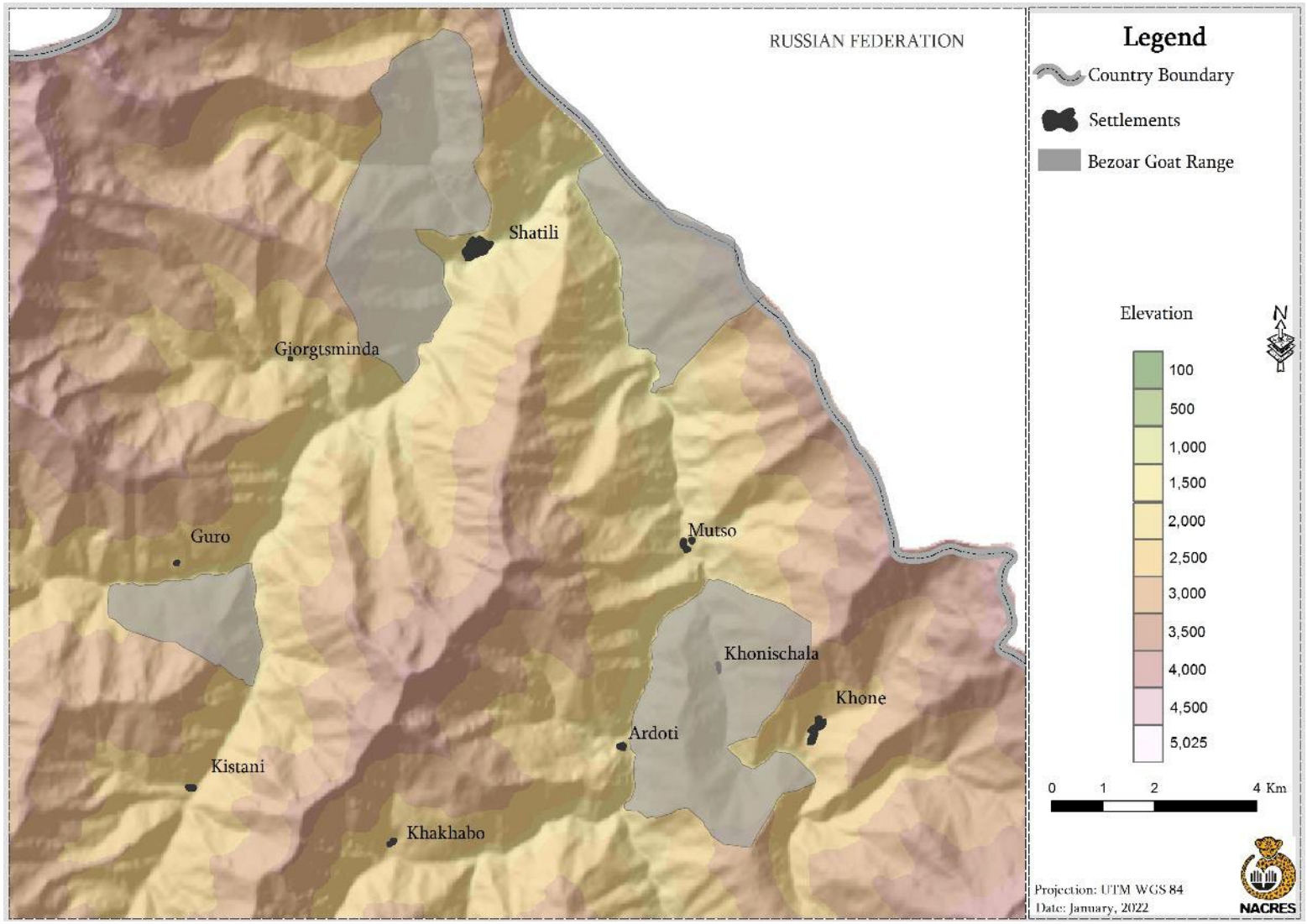
Appendix #4 Bezoar goat observation points in Pshav-Khevsureti protected areas



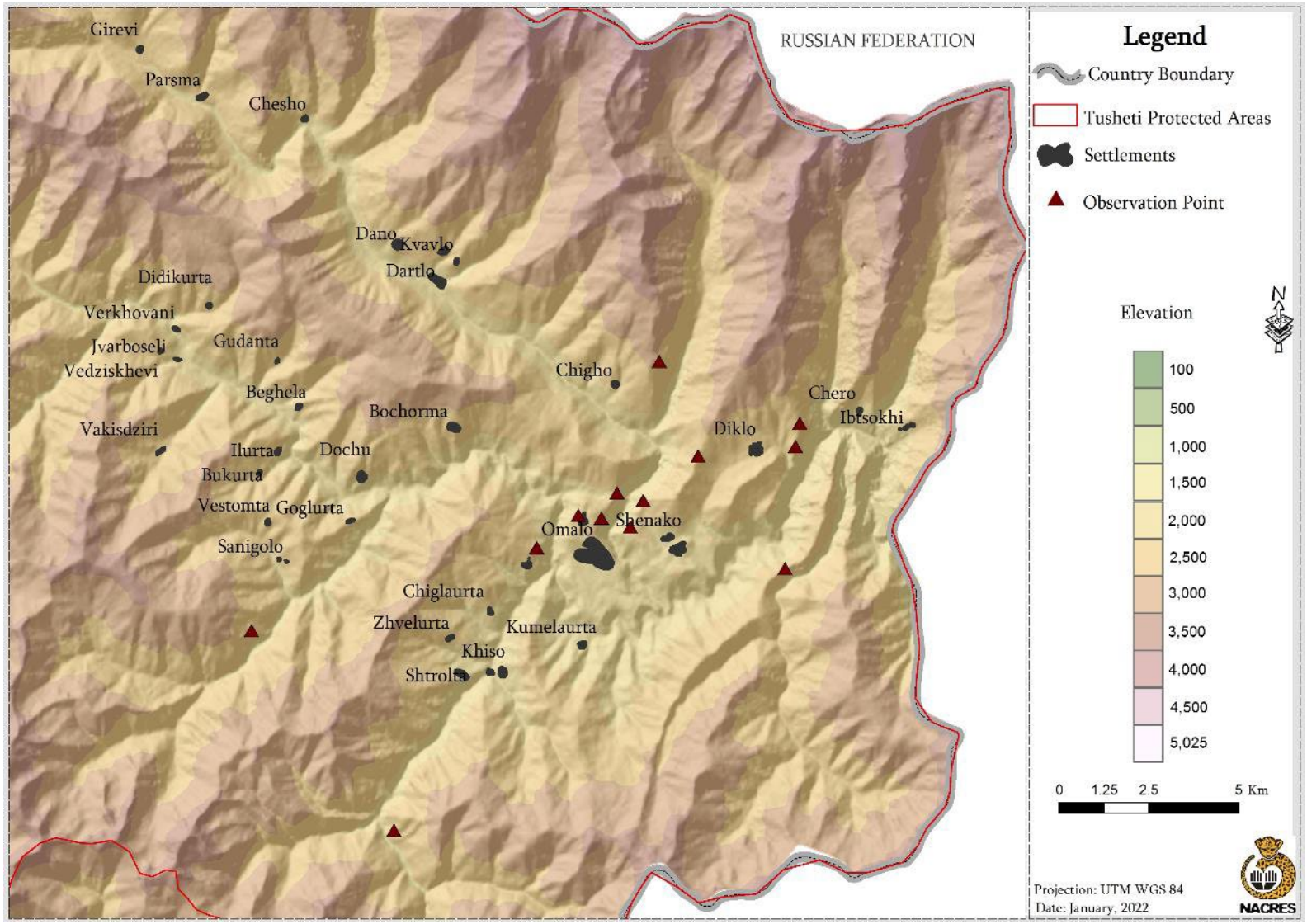
Appendix #5 Observed bezoar grout groups in Pshav-Khevsureti PA



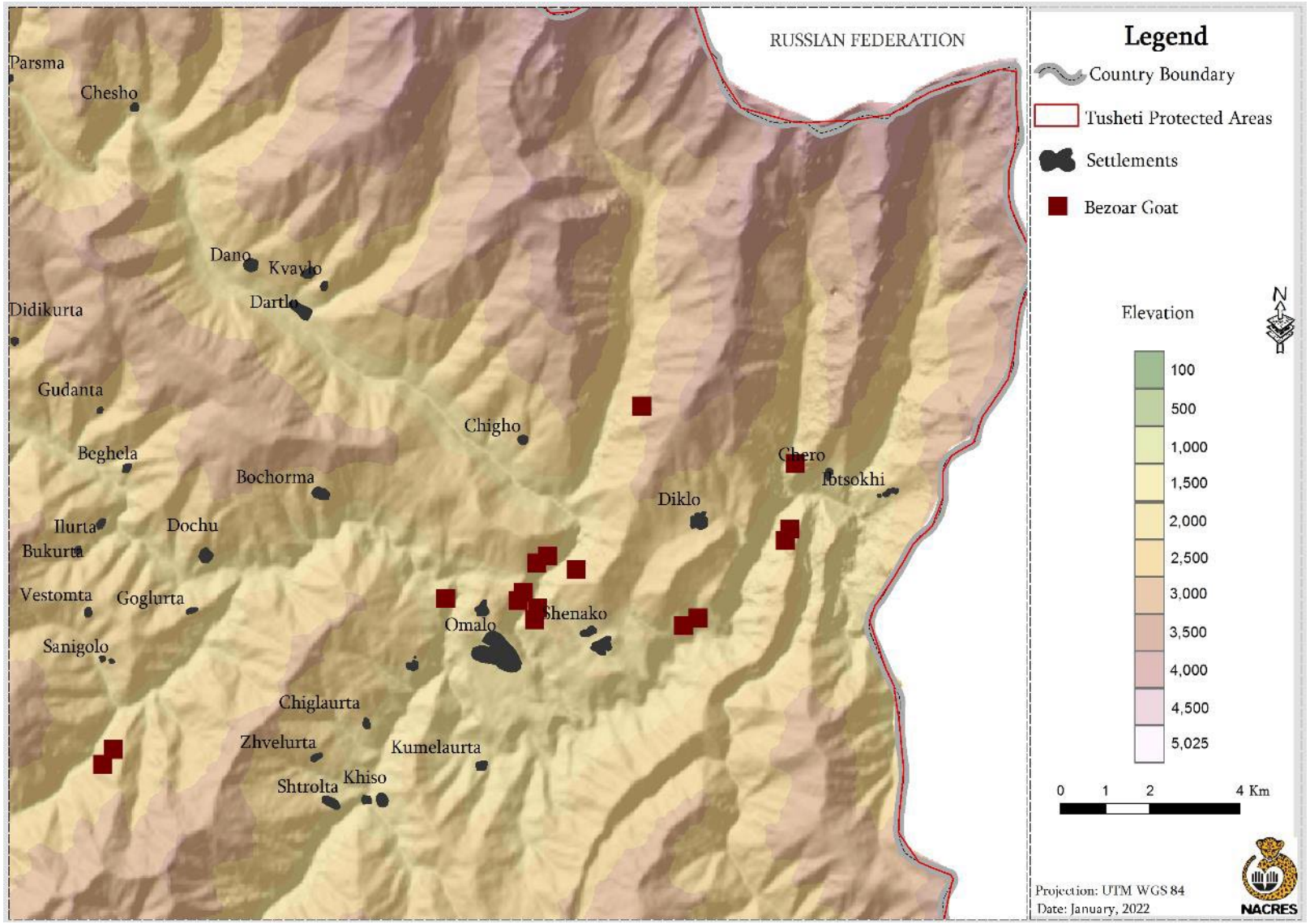
Appendix #6 Bezoar goat distribution in Pshav-Khevsureti protected areas



Appendix #7 Bezoar goat observation points in Tusheti protected areas



Appendix #8 Observed bezoar goat groups in Tusheti PAs



Appendix #9. Bezoar goat distribution in Tusheti