



Georgia

Report on Biodiversity Assessment of Tusheti Protected Areas Complex



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Abbreviations

GEF – Global Environment Facility

GPADP - Georgia Protected Areas Development Project

m.a.s.l. – meters above sea level

NACRES – Centre for Biodiversity Conservation and Research

TPA – Tusheti Protected Areas

UNDP – United Nations Development Program

WB – the World Bank

Executive summary

This report presents the results of the biodiversity survey conducted in Tusheti during summer and autumn 2010.

The main goal of the survey was to update the existing information on those components of Tusheti's biodiversity that have special conservation importance as well as a potential of sustainable nature-based tourism development on the Tusheti pilot site.

As per survey priorities the following main objectives were achieved:

- The populations and distribution of Wild goat and Tur were assessed and relevant thematic maps were produced
- New data were collected on large carnivores and other large mammals; the previously existing species lists and knowledge of their distribution was updated.
- A new bird inventory was conducted and the existing bird list for Tusheti was updated.
- Important bird sites in Tusheti were identified.
- Part of the TPA staff and also members of the local community were involved in the surveys and received training in certain field techniques of biodiversity monitoring.
- The potential of nature-based tourism in Tusheti including wildlife watching (mammal and bird watching) was evaluated and relevant recommendations were prepared.

In addition to the main objectives some additional information was gathered that was considered to have importance in the process of TPA reclassification and management planning as well as in the tourism development planning. For example data were collected on butterflies, among other things some very rare species of butterflies were recorded in Tusheti for the first time; sacred forest sites were surveyed and a primary map was created; using remote sensing technologies and GIS the existing forest and meadow distribution maps were updated.

1 The Scope of the Survey, Goals and Objectives, Constraints

This report presents the results of the biodiversity survey conducted in Tusheti during summer and autumn 2010. The survey results were analyzed in conjunction with all existing relevant information. The planning process, the choice of approaches and methods as well as the selection of target components fully derived from the predefined goals and objectives as stipulated by the Project. All known constraints that are usually important to any field work in Tusheti were also taken into consideration.

The main goal of the survey was to update the existing information on those components of Tusheti's biodiversity that have special conservation importance as well as a potential of sustainable nature-based tourism development on the Tusheti pilot site.

The objectives of the survey were as follows:

- To assess the populations and distribution of Wild goat and Tur
- To collect data on large carnivores and other large mammals to update the existing species lists and knowledge of their distribution
- To conduct bird survey including bird inventory (to update the existing bird list for Tusheti) and to identify important bird sites in Tusheti
- To gather, as a by-result of the field surveys, information on other biodiversity components that may have importance in the process of TPA reclassification and management planning as well as in the tourism development planning.

There were additional objectives too:

- To train and involve TPA staff and members of the local community in biodiversity survey with the purpose to encourage their participation in biodiversity monitoring activities.
- To assess the potential of nature-based tourism in Tusheti including wildlife watching (mammal and bird watching) and to develop relevant recommendations.

The major obvious constraint to this and to any field survey to be conducted in Tusheti is the limited accessibility to the site. Tusheti is only accessible in the summer season. The time period for conducting field activities is limited to roughly from mid June to the end of September. The Project only had one summer season to carry out biodiversity survey. No data collected during only one season of a single year can be regarded as sufficient. Nevertheless, the Project made every effort to maximize data collection efficiency and gather as much and as credible information as possible. Overall, the obtained data in conjunction with the earlier information can be regarded as sufficient for effective planning

namely for TPA reclassification, planning of sustainable tourism, business plan development and also to update the 2006 TPA management plan. In addition to achieving all the main objectives, the survey also obtained valuable new information on other biodiversity e.g. butterflies which may have a role in tourism development in Tusheti. In addition using the satellite imagery provided by the Georgia Protected Areas Development Project (GEF/WB) and based on the baseline biodiversity studies conducted under the same project in 2003 and 2004 updated maps of forest and meadow habitats were created.

The biodiversity studies once again showed needs of further biodiversity assessment and monitoring.

2 A brief overview of existing data

As mentioned above, Tusheti is a very difficult region for field surveys primarily due to very limited accessibility to the region as a whole as well as to certain parts of the site. The information about the fauna and flora of the region is very scarce. Particularly little is known about the fauna, especially on the invertebrates. First botanical studies were conducted in mid 19th c. By the end of 19th and in the beginning of 20th century first flora inventories were also carried out¹. Numerous new species were recorded and the first big picture was created on the flora and vegetation of the region. Later geobotanical studies were also carried out. Systematic botanical studies were conducted during 1986-1990 by the Institute of Botany of the Georgian academy of Sciences jointly with the State Museum of Georgia. On the other hand, only occasional zoological studies have been conducted in Tusheti. Even by the time the Tusheti state reserve was created very little or nothing was known about the local fauna and population numbers. Small scale fauna surveys were conducted in 1999-2001².

The first comprehensive baseline studies of biodiversity including bird and mammal inventories were conducted by NACRES in 2003-2004 within the Georgia Protected Areas Development Project (GEF/WB). As a result of those studies:

- The vegetation was classified and mapped
- The flora of the national park was surveyed and key plant species for biodiversity monitoring were identified
- Abundance and other population parameters were estimated for key species (wild goat and tur) and primary maps of their distribution were produced
- Main threats to the species and habitats were identified and assessed
- Data for other species including large mammals and birds were gathered.

¹ Source: Management Plan for Tusheti National park and Tusheti Nature Reserve, 2006

² Project: Monitoring of Wolf, *Canis lupus*, on the Reserves of East Georgia, NACRES, funded by WWF.

- The first bird inventory was carried out.

The baseline studies were an important step to increasing our understanding of Tusheti's biodiversity; numerous new data were gathered and existing information was updated. But the knowledge of the biodiversity of Tusheti is still rudimentary and it may be many more years of surveys and research before we have more or less complete species lists for at least some taxa. For example, bird inventories may still yield new species for the region for many years in the future. By nature certain components of biodiversity are more stable over time than others. Therefore no apparent changes should be expected to have happened in the distribution of the major vegetation classes since the last baseline surveys (that is over the past 6-7 years). This is primarily because there have been no obvious serious changes in the environment, natural or human-induced. Therefore as far as vegetation cover is concerned any changes that a new assessment may reveal should be associated with the effort and new approach (for example using remote sensing techniques) not with any real changes. On the other hand any new study is bound to contribute to the existing knowledge of certain wildlife populations due to the following: (1) the baseline studies were the first attempt to assess bird and large mammal fauna of Tusheti and (2) since the baseline surveys (2003-2004) some important changes took place in the region and in the country as a whole such as the establishment of the TPA complex administration and improved control of illegal use of biological resource at the national level. Some wildlife may already have responded to those changes. Indeed, there have been sporadic reports about wild goats appearing in areas where they had not been seen for some years. Isolated red deer sightings have also been reported over the last years.

Large mammal surveys were conducted for the first time in 5 years in summer 2009 as part of the joint work of Tusheti PA administration, WWF Caucasus Programme Office and NACRES³. The primary objective of this initiative was to conduct a large mammal survey focusing on the Leopard and its main prey species, Wild goat and Tur. The survey relied on camera trapping as a main means of data collection. As a result of this survey important new information was collected. However it did not yield any new evidence of leopard presence in Tusheti. Currently there are still many gaps in the knowledge of Tusheti's biodiversity. The 2006 TPA management plan lists a number of research priorities which appear to be still adequate. Among the priorities are: update of the existing bird list, the inventory of the local invertebrate fauna, range mapping and population assessments of key mammal species, assessment of River trout, the only fish species found in Tusheti, etc.

³ The initiative was supported by WWF and the EC-funded FFI/NACRES "Georgia carnivore Conservation Project".

3 Description of the Work: Field Surveys, Methods, Trainings in Biodiversity Monitoring

3.1 Target mammal species survey

3.1.1 Methods

Camera trapping

The assessment of mammal populations heavily relied on camera trapping. This technique has been extensively used by NACRES for field data collection on larger mammals throughout Georgia including Tusheti. In the light of the given survey objectives camera traps were expected to help gather information on:

- Population numbers of Wild goat
- The habitat use and range of Wild goat, Tur and large carnivores
- The presence/absence of Leopard and Red deer
- Daily activity of large mammals
- Other mammal species.

Two types of camera traps were used: digital (12) and film-based (4). Both were equipped with a heat and motion detector and use additional flash lighting if needed.

Any survey that involves camera trapping would need a very detailed planning and the amount of collected data directly depends on how long the camera traps have been operational in the field (i.e. number of trap/days or trap/nights). If dealing with rare and/or naturally low density species the more trap/days we have the higher the chances of getting those animals on the photos. Therefore in order to maximize our effort it was necessary to begin the survey as early as possible i.e. as soon as the access road to Tusheti would open and movement within the site would be possible. In our survey we intended to set camera traps not randomly but at trails and passes that were more actively used by the animals. Therefore potential trap sites were identified on the map using the existing knowledge and information as well as our own experience from previous years. Once in the field, if any of the planned sites were found not suitable for setting up a camera trap we had to look for a suitable site in the nearby areas. If the trail was too wide for the sensor of a single camera trap to cover it completely we installed two camera traps opposite to each other.

Our film-based camera traps require more attendance as both the film and batteries need to be changed at least once in 4-6 weeks. Therefore such camera traps should be installed in more easily accessible sites e.g. near the villages. The digital camera traps on the other hand may remain operational over extended periods (sometimes up to 8 weeks). They can store a

large number of photos and their batteries can last longer than 2 months. So digital camera traps may be installed in more remote areas.

All data obtained by the camera traps were entered into a special data base. Some results are relatively easy to extract from such a data base. For example, the information on species richness or on the daily activity of the animals. However, individual identification usually requires much effort and it can primarily be applied for those species that have unique external features (such as skin pattern in leopards and other spotted cats). This exercise may yield a good estimation of the population numbers (at least minimum population numbers - N_{min}). Wild goats do not normally have any individual marks but other features such as age, body size, horn size and shape, skin colour, may still be used for individual identification although with less accuracy.

Direct counts

Direct counts were used to estimate the wild goat population. Observations were made from preliminarily selected points. It is one of the critical conditions of any direct counts that the possibility of counting the same individuals/groups more than once be excluded. From literature it is known that in this species groups of females with young usually only travel 1.5-2 km horizontally. Hence the observation points had to be selected so that they would be at least 2 km apart. Direct counts were conducted in the morning during 07:00-09:00 hrs and in the evening during 19:00-20:30 hrs. During the observations, individuals were counted by sex and age where possible. Each herd was given a name usually corresponding the name of the site/gorge.

Wild goat counts were also conducted en route to various study sites. This information enriched the point observation data and helped create a more complete picture of the population and its range.

All the obtained data were processed and entered in a unified data base. In case of multiple counts of the same herd the highest count was used in final calculations. Two count data were considered as being from different herds only if the places they were recorded were at least 2 km away from each other.

Tracking and footprint identification

In situations where direct observations are difficult or impossible tracking may provide crucial information on the local wildlife. This primarily applies to such secretive and shy large mammals as brown bear, wolf, lynx and leopard. By identifying and recording animal footprints species presence/absence data can be gathered that can contribute to the

mammal inventory. Recording and mapping successfully identified foot prints may be used to determine or update the range of the given species. If certain conditions are met (e.g. standardized data collection) and sufficient information is collected at a regular basis a population index can be calculated and used in species monitoring.

Tracking and footprint identification may be an important tool for an effective use of other techniques too. We heavily relayed on footprint identification in locating suitable sites (busy animal trails) for camera trapping. We also used footprint data in habitat use assessment for the key species and for obtaining the big picture of the overall distribution of various species throughout the study area. This information may help future surveys and monitoring planning.

Data mapping and GIS analysis

All field data and associated locations (species presence data, camera traps sites, observation points, etc.) were taken using GPS and then mapped in Arc GIS Program 9.3.1. Primary maps of tur and wild goat habitats were created based on direct observations, footprint recordings, and camera trap data. Using GIS analysis the main parameters of the tur and wild goat habitats were identified including terrain features, vegetation cover and altitude, and simple habitat models were developed. Using these models we identified wild goat and tur habitats in such areas where it was impossible to conduct ground surveys (such areas include state border zone and totally inaccessible parts of Tusheti). By combining field survey results with those of the GIS analysis we could develop the range maps of the two species. On the other hand it should be noted that the updating of the species range maps (similarly to species lists) should be considered as an ongoing effort; existing data must be verified through permanent monitoring and any new information obtained as a result of monitoring activities should be used to update the existing range maps.

Remote sensing and land cover

Using remote sensing and GIS we developed the Land Cover map for Tusheti which basically is a digital image with certain predefined classes of physical material on the surface of the territory. In this case the classes included forest, graze lands, shrub, rock, scree slopes, glaciers, etc.

For the creation of the Tusheti land cover remotely sensed multispectral imagery was analyzed applying supervised classification. At the first stage we identified four main classes

- (1) Forest including: (1.1) pine, (1.2) birch, (1.3) beech

- (2) Bare rock and scree
- (3) Meadows (graze lands)
- (4) Arable land

Later we selected multispectral imagery by Landsat ETM+ (date: 2001/06/13), that was then analyzed with specialized software (Leica Geosystems Erdas Imagine 9.2). Supervised classification relayed on field data with GPS measurements and high resolution aerial photos with which certain classes as well as geometrical and spectral accuracy were verified. As a result we created a land cover map with the spatial accuracy of 30-90 meters, which was then used as a basis for producing high accuracy thematic maps.

3.1.2 Description of field surveys

Field surveys in Tusheti PA complex were conducted from June 30 through mid October 2010. The primary objectives of the surveys were to assess the populations and current distribution of Wild goat and Tur. In addition we intended to gather information on large carnivores and other mammals for the purpose of updating the existing species lists and the knowledge of their distribution.

All existing information on the target species was gathered and reviewed in the preparatory phase of the field surveys. The primary focus was naturally on Wild goat and Tur. Field surveys were planned considering all existing literature and accounts on these species as well as NACRES' experiences of previous similar surveys and of working in the region.

During the preparatory phase we testing all the field equipment including camera traps, selected preliminary camera trap sites and located them on the map. In the selection of potential trap sites we fully considered our previous experience and knowledge of the area. This helped us identify sites from which maximum data on the target species could potentially be collected. The preliminary camera trap sites as much as possible covered the perceived core wild goat and tur areas. Once in the field, interviews with the TPA staff (primarily Mr. Onise Ichirauli, the Head of rangers service, and with Mr. Temur Akimidze, ranger) as well as with local people (hunters) helped us further refine the survey plan including survey routes and camera trap sites. Information from local people was also collected throughout the field surveys. This information helped us not only find suitable camera trap sites but also identify/verify wild goat and tur core areas.

Some of the preliminarily selected camera traps turned out to be not very suitable for setting up a camera trap. This was mainly due to heavy human and sheep presence or because of the site's or access trail's proximity to the state border zone with Russian

Federation (notably the restricted border zone has been apparently extended over the last years).

Overall the surveys covered all the major gorges of TPA and a total of 16 camera traps were installed throughout the study area. For the tur population assessment we surveyed and camera traps were installed in the following areas: the sources of the Larovanis Tskali, the Borbalo massif, parts of the Pankisi Alazani gorge, Atsunta ridge, Madnis Khorkhi and Chesho Khaa. These are the areas where tur core areas are situated and according to the locals leopards have also been sighted several times. For wild goat assessment we surveyed and set camera traps in the key wild goat areas including: Tselit Mta area, Ighone ridge, the Vestmoke area, Diklo and Chigho gorges.

The camera traps were installed on trails and passes that were apparently intensely used by animals. Four film-based camera traps were placed in the wild goat habitats around village Omalo. Twelve digital ones were installed mostly in the tur habitats.

As mentioned above, the film-based camera traps require more frequent attendance. Consequently they were first checked in August i.e. one month after their instalment to change the films and batteries. All the camera traps were collected in October.

Foot prints of the target species were recorded throughout the surveys and their GPS locations were taken for subsequent mapping. This information contributed to the range mapping of the target species.

3.2 *Bird Surveys*

Bird surveys were conducted during August 21 to September 2, 2010. This is in general not the best time to carry out a bird inventory. The best time for this activity is May-June when birds are usually easier to spot and to identify. During this period breeding birds tend to become more active as they prepare for mating. Breeding birds try to establish and protect their territories, actively sing and engage in other forms of display. The plumage of many birds also becomes more conspicuous at this time. In addition in May-June, it is possible to observe not only breeding birds, but also migratory species. However Tusheti is largely inaccessible during this period of the year. The road to Tusheti was already open in late June onwards, but from previous surveys we already had some information on the breeding birds. Therefore we decided to conduct the bird survey in August and early September in order to also catch at least the beginning of bird migration and thus attempt to obtain data on both breeding and migratory birds.

Field surveys relayed on identifying and recording all bird species encountered on the pre-defined survey routes. Both visual observations and audio signals were used for species identification. Besides, indirect means were also utilized where possible, such as nest identification, habitat analysis, and interviewing local people (protected area staff, shepherds, etc).

As a first step for survey routes planning all existing data were reviewed and information gaps were identified. Specific sites were revealed that had never been surveyed before. Some of these sites appeared to have habitats and other characteristics that were considered potentially important for birds. As a result the main survey objectives were identified and a detailed work plan was worked out:

- Based on existing information and map analysis survey routes were planned so that they covered a wide range of habitats. This would increase the possibility of recording more species and update the current bird list.
- Suitable habitats of the species of international birdwatching interest were identified and survey routes were planned accordingly to verify the presence of those species.
- Popular visitors trails were selected to conduct bird inventory so that we could obtain information on the bird species that may be seen on these trails.

Bird survey was conducted on the following routes:

- Village Upper Alvani – village Omalo (the main access road to Tusheti)
- Village Omalo – Tsitei Mta
- Village Omalo –Lake Oreti
- Village Omalo –Atsunta
- Village Omalo – Borbalo
- Village Omalo – village Diklo
- and*
- the Omalo surroundings.

3.3 Training in Biodiversity Monitoring

In summer 2009 part of the TPA rangers participated in a short training in biodiversity monitoring. The installing and maintenance of film-based camera traps was one of the main topics of that training⁴. However it was still considered necessary to deliver more training to the TPA staff. Firstly, by summer 2010 some significant changes had occurred in the park personnel. Secondly, our surveys were to relay mainly on digital camera traps as opposed to

⁴ The trainings and field practical were focussed on film-base camera traps because WWF had provided to TPA film-based equipment. Digital camera traps were only covered in general terms and very briefly.

film-based ones since within the framework of joint APA, WWF and NACRES *Leopard Research and Monitoring Initiative* a number of new digital camera traps were provided by WWF. The digital camera traps have many advantages but their effective use requires additional training and practice.

It was considered inappropriate to organise specialized training group sessions during the very busy summer season as far as the ranger service is concerned. Therefore rangers were invited to accompany our biodiversity survey team and receive training directly in the process. This way they could increase their qualification through actual participation in research and monitoring activities; acquire practical knowledge, experience and field skills. However this approach was based on the assumption that the rangers already had basic knowledge and experience in biodiversity monitoring (according to their job descriptions biodiversity monitoring is one of their primary duties). Also, the motivation and personal attitude of the rangers would be even more important than in more controlled conditions of organised training sessions. Besides, it was clear that only those rangers could participate in the training that would be assigned to join the biodiversity team by the TPA administration.

The training topics were selected according to the priorities, approaches and methods to be potentially applied in the biodiversity monitoring. Large mammals and bird species monitoring is likely to rely on direct counts and/or camera trapping and other indirect methods including counts of tracks and other signs or surrogates. Therefore the main topic included: the installing and maintenance of camera traps, counting and monitoring the key mammal species by direct observations, bird identification and other general issues such as using of GPS , map reading, etc.

Our aim was to involve not only park rangers but also representatives of local communities. To this end we intended to find local enthusiast to introduce them to the basics of biodiversity conservation and to actually engage them in biodiversity mentoring.

3.3.1 Training in biodiversity monitoring: TPA rangers

The following rangers accompanied the biodiversity team in the field: Temur Akimidze (12 days), Levan Ichirauli and Paata Asabashvili (2 days), Mamuka Gatseridze (2 days) and Vasil Ididze (1 day). Among those rangers Temur Akimidze also participated in the training conducted by NACRES in 2009. Notably he showed exceptional interest and motivation in biodiversity monitoring. Presently Temur is virtually the only ranger in the TPA administration who has sufficient experience and skills to set up camera traps independently i.e. to find a suitable site, install and then collect information from a camera trap. However he still needs more practice. As for the other rangers their current qualification is not sufficient for camera trapping or other monitoring activities.

Certain information on the importance of bird watching and birds in general were delivered to the rangers that had been assigned by the TPA management to participate in the bird surveys. These included: Temur Akimidze, Emzar Mozaidze, Irakli Elanidze and Giorgi Karsamauli.

In summary, certain training in biodiversity monitoring was delivered to those rangers that had been assigned by the TPA management to participate in the field surveys with us. In general the TPA rangers appeared to lack motivation and interest in biodiversity issues.

If TPA administration intends to conduct biodiversity monitoring independently among other things we would advise that (1) a very short number of highest priorities be identified that might be implementable with the current low qualification and very limited resources and (2) parallel to this some immediate decisive measures be taken to increase motivation and qualification among the rangers.⁵

3.3.2 Training local community representatives

The young guide Shota Lagazidze was recommended by the TPA administration and he joined us in the bird survey. He received training in bird identification and also in the basics of bird watching. He was also given a copy of NACRES' "Field Guide to the Birds of East Georgia". Notably he had a good understanding of the major tourist trails in Tusheti and also showed much interest in birds. Within a short period of time Shota learnt to recognise some of the common bird species found in Tusheti in summer.

During 3-13 September 2010 in close cooperation with TPA administration a special ecological camp was organised for younger members of the local community. The main objectives were (i) to increase awareness of biodiversity and protected areas among the Tushetian youth, (ii) to train them in the basics of biodiversity monitoring and (iii) to do a practical exercise, the mapping of sacred forests sites in Tusheti.

The participants learnt more about the biodiversity of their region and also directly contributed to the collection of valuable information about the sacred forest sites in Tusheti. Notably no map of sacred forests was available for Tusheti. These forests are not only cultural and religious sites, but they also have a significant biodiversity value. In addition sacred forests need to be considered in the process of TPA reclassification and further management.

⁵ These issues will be further considered in the other components of the project including the development of a law enforcement strategy.

The following students participated in the training: Nona Bakhturidze (Georgia State Agricultural University, Department of Agro-economy, 4th year), Tinatin Tcholikidze (Tbilisi State University of Economic Relations, Department of Law, 3rd year), Temur Abaidze (Georgia State Agricultural University, Department of Agro-engineering, 3rd year), Jarji Bashinuridze (David Agmashenebeli University, Business and Management, 4th year), Eter Abulidze (Ilia State University, Conservation Biology and Ecology, MSc student).

The participants attended a workshop at the TPA visitors' centre at which a presentation was delivered by the TPA Natural Resource Specialist on the protected areas role and importance. They were shown the documentary "Tusheti Protected Areas" and had a meeting with the TPA Director, Anzor Gogotidze. At the Keselo Ethnographical Museum the participants attended a presentation by the TPA Visitors Specialist on environmentally friendly traditions of Tusheti. The camp participants received training in the use of GPS. Then they visited and took GPS measurements for the sacred forest sites and mapped them. Later the project's GIS specialist further analyzed the data and produced the final map (see Chapter 4.5 for the results of the sacred forest mapping exercise)

4 Results and Analysis

4.1 Wild goat (*Capra aegagrus*)

Results of direct observations

In Tusheti wild goats are mainly found in the gorges of the Andiis Koisu, the Pirikita Alazani and the Tusheti Alazani and their preferred habitat is pine forest with abundant steep and rocky sections. During certain periods of the day, females with young as well as younger (non-breeding) males come out to graze in the relatively protected forest openings at which they can be observed and counted.

We selected three sites for direct wild goat counts:

- (1) The Keseloebi from which one can see the Khakhabo hillside as well as both shoulders of the Tusheti Alazani gorge.
- (2) Kue, from which it is possible to observe parts of the Tselit Mta and the rocky slopes below village Shenako,
and
- (3) Chigho Khaa, from which we observed rocky slopes below the Lashari Salotsavi (a religious site) and the forested hillsides just across the observation point.

Observations were conducted twice a day during 7:00 - 9:00 hrs and from 19:00 to 20:30 hrs during 20 days in total in June and August. Each of the observation points where at least 2

km away from each other. Some of the observations coincided with extremely hot days due to which the animals kept to the bottom of the gorge and never moved upwards more than 100 meters above the water.

Wild goats were also counted along the survey routes. For example, at Tsitei Mta, Chigho Khaa, Ighone and Vestmovake areas. This information contributed to the estimation of wild goat population numbers. The results of the direct counts are summarised in Table 1 below.

Table #1. Results of direct wild goat counts

Observation point	Group location (herd name)	Numbers (N)	Sex/Age composition
Keseloebi	"Tsikhis Perdi"	2	2 females
	"Khakhabo"	8	5 females and 3 young
Kue	"Shenako 1"	7	5 females and 2 young
	"Shenako 2"	2	2 females
Tsitei Mta	Tsitei Mta	2	2 females
Chigho	"Salotsavi 1" (below "Salotsavi")	11	4 females and 7 young
	"Salotsavi 2" (opposite "Salotsavi")	13	7 females and 6 young
	"Chigho" (Chigho sources)	6	6 males
Ighone	"Ighone 1" (forested slopes)	11	6 males, 5 subadults (males?)
	"Ighone 2" (trail at the farm)	2	2 subadults
Vestmovake	"Vestmovake" (forested slope)	4	4 males
<i>Total</i>		<i>68</i>	

Camera traps data

During July-August camera traps that were installed in the wild goat habitat took a total of 84 photos with wild goats⁶. The simple total of individuals on these photos was 125. However a detailed analysis and comparison of individual animals revealed that there were not more than 46 different individuals shown on those pictures. The results are summarised in Table 2.

Table #2. Camera trap data (July-August, 2010)

Name of site	Total No. of wild goats on photos	No. of identified individuals	No. of adults	Sex/Age composition
Tsitei Mta	16	12	8	3 females, 3 males, 2 subadults, 4 young
Chigho	65	11	4	4 females, 7 young

⁶ No additional noteworthy data on wild goats were obtained during September to October.

Ighone	22	16	9	6 females, 3 subadults, 7 young.
Vestmovake	22	7	7	7 males

Wild goat range

Based on the survey findings a new updated summer range map of wild goat in Tusheti was created (see Appendix 1, Map #1).

According to our data the highest altitude at which wild goats occur is 3,200 m.a.s.l. (an adult male was recorded at this elevation by one of our camera traps in the northern part of TPA). Notably this is exactly the altitude that has been mentioned in the literature (Red Data Book of Georgia 1982). Therefore we assumed that the upper limit of the wild goat distribution in Tusheti to the north and north-east roughly follows this altitudinal mark⁷. For drawing the range border lines at lower altitudes (to the west, south and south-east) we considered the main features of wild goat habitat such as slope, forest cover and the availability of rocky areas. GIS analysis first produced a primary range map that was then verified by survey results.

According to the new updated range map the summer wild goat range covers 95.6 sq. km. which is significantly larger than the 2004 estimation. The said area is the total wild goat range that includes not only forested part but also parts of the alpine and subalpine zones (non-forested part) in which only breeding males are usually found. The forested part of the range can be referred to as the core range as it is used by all members of the population (females, subadults, breeding and non-breeding males). The total area of the core range is 62.9 sq. km.

It is important to note that this is the summer range of the wild goat in Tusheti. It is very likely that the spatial distribution of these animals changes with season. In addition to the seasonal weather conditions in Tusheti the situation changes dramatically between the summer and winter months in respect of other factors too. By mid autumn most of the villages become completely deserted, human movement sharply declines on the roads and trails crossing through the wild goat habitats, all the sheep are driven down to the winter pastures in the lowlands, and there are also likely changes in the distribution of large

⁷ Notably wild goats are found at higher altitudes elsewhere, for example in Turkey (Gundogdu, Ogurlu 2009). But conditions are obviously different in Turkish mountains from those in the Greater Caucasus in Georgia. Therefore this information was not considered relevant.

carnivores primarily wolves. As a result of these changes the wild goats may expand their territory in various directions primarily toward where the unoccupied forest habitat is.

Isolated wild goat sightings have been reported from certain forested sections that are not currently included in the summer range. One such section is the forests toward village Dartlo. However based on the available confirmed data and GIS analysis these sections do not meet the criteria of suitable wild goat habitat. Nevertheless we can not completely exclude the possibility of use of those areas by some individuals.

Wild goat population numbers/density

We estimated wild goat population numbers using both the results of direct counts and the camera trapping data. In the case of the wild goat direct counts usually give more accurate information. Therefore camera trapping data were used as a supplementary information. For the purpose of number estimation we considered only individuals above 1 year old of age. The total area of the surveyed part of the forested (core) portion of the wild goat range was 30.2 sq. km. and the total number of adults/subadults recorded was 53 (hence the average density 1.75 individuals per square kilometre). Considering the method and overall effort undertaken during the survey we assumed that this number is very near the real wild goat numbers on the investigated portion of the range. Similarly, breeding male density was calculated in the non-forested portion of the range to be 0.6 individuals per square kilometre.

By generalising the above two estimates over the respective parts of the verified wild goat range (the core forested part - 62.9 sq. km. and non-forested part - 32.7 sq.km.) and by combining the two results we have estimated the minimum population numbers at 130 individuals.

This estimate (≥ 130) is considerably higher than that of the 2004 baseline studies (95 individuals). This may be an indicative of population growth but it may also be associated with the increased effort and use of new techniques (camera traps). It is important to remember that the data from only two separate years are by no means sufficient to establish the population trend. Surveys and monitoring need to continue for at least several more years to detect the trend.

The social structure of the wild goat population

According to our data, in the summer months wild goats live in two types of groups: (1) females with young and subadults of both sexes and (2) adult males. Groups of the first category usually remain in the forested part of the range strongly preferring rocky areas.

Especially females with young almost never leave the forest and remain in the vertical range between 1,600 – 2,500 m.a.s.l. Presumably mixed groups of subadults (groups with both sexes) are often seen separately from the females with young. The second category groups are formed by adult males that sometimes join in groups. However older males are usually solitary and their habitat stretches from the forest all the way up to the alpine and even subnival areas. Our camera traps recorded old males both in the forest (at about 2,200 m.a.s.l.) and in the subnival zone as high as 3,200 m.a.s.l.

The largest group we recorded during this survey included 13 individuals (7 females and 6 young). According to one of the park rangers (Temur Akimidze) wild goat groups never include more than 15 members. Elsewhere, according to literature (Gundogdu, Ogurlu 2009) male groups usually consist of 4-5 members. However, during the 2004 baseline surveys in the Diklo upstream areas we recorded an all-male group with as many as 12 individuals (NACRES 2004).

Daily activity

The camera trapping data were also analysed to reveal any patterns of wild goat daily activity during the period from July through August. We used the rate of wild goat recording on the camera traps as a measure of their activity level. The animals are likely to move about more intensely in their active periods of the day and the more they move the higher the chances of their capturing on the camera traps. The camera trapping data (photos) were classified into one-hour long time classes e.g. from 07:00 hrs to 08:00 hrs. As a result we obtained a frequency distribution of camera trap site crossing by wild goats. In case a single picture contained more than one individuals, it was still considered as one sample.

The daily (24 hrs) activity of wild goats is illustrated in Figure 1. The chart shows that the wild goats begin to move about actively from 05:00 hrs and the highest level of their movement on the trails occurs during 06:00 hrs to 07.00 hrs. This is the time during which the wild goats are grazing on or are heading to the forest meadows. By noon their activity stops and only resumes after 15:00 hrs. Wild goat movement levels are high during 16:00 hrs. to 17:00 hrs too during which time the animals are apparently going back to the feeding sites. High movement levels are maintained till 20:00 hrs.

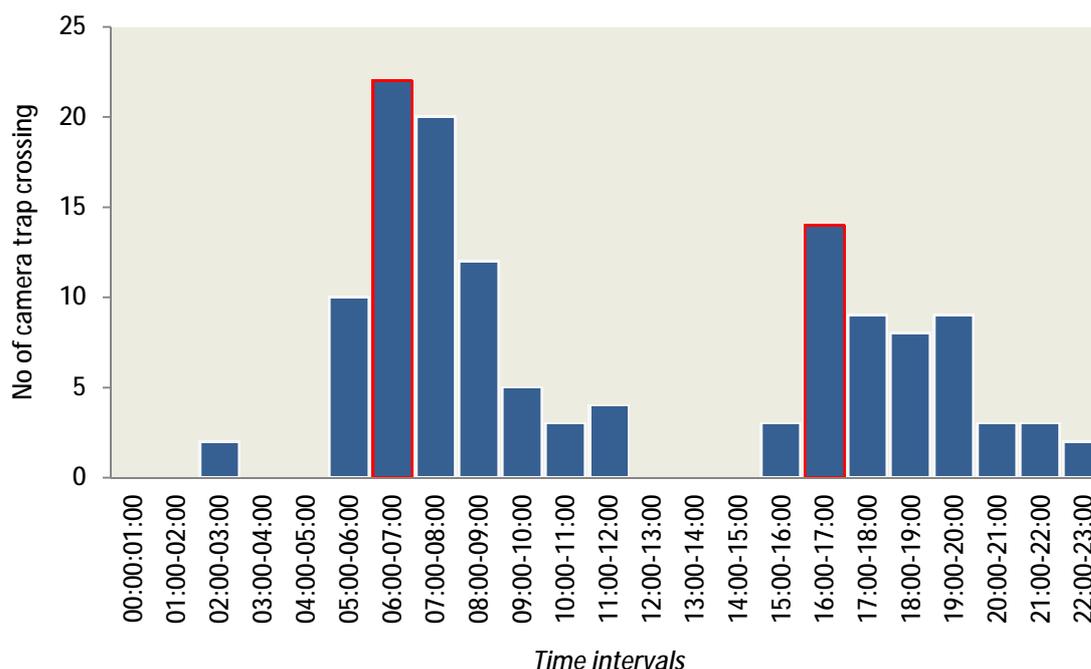


Figure 1. Wild goats daily activity on TPA based on camera trapping results obtained in July-August, 2010.

4.2 Tur (*Capra cylindricornis*)

The range

In Tusheti, during the summer months turs are mainly found in the alpine, subnival and nival areas with the majority of the animals preferring extremely inaccessible territories in the nival and subnival zone. They only rarely come down to the alpine areas to graze on the alpine pastures because most of these areas are occupied by livestock (sheep and goats). During the summer direct counts we never observed tur herds below the 3,100 m.a.s.l. mark. However as our camera trapping data indicate individual animals *do* occasionally come down to the lower altitudes such as 2,800 m.a.s.l. The surroundings of the sources of the Chesho and Chigho Khaa appear to be very important tur areas since they feature extremely remote and inaccessible areas that attract large herds of turs.

In the mapping of the summer range of Tur in Tusheti we relayed on the lower limit of its vertical distribution. Tur summer distribution indeed appear to have a more or less distinct lower limit in Tusheti. Based on our findings we assumed that this limit roughly follows the 2,800 m.a.s.l. elevation mark. Above this mark virtually the whole territory is considered as tur range (Appendix 1, Map #2). Hence, the total tur range in Tusheti was calculated to cover 330 sq. km.

The Atsunta Ridge appears to be one of the core areas for tur. This includes: the Borbalo massif, mount Amugo and surrounding hills, the Atsunta pass and Madnis Khorkhi. The mount Amugo area, namely the Nartsapi pass features practically ideal habitats for the tur. Abundant shelter, good pastures, numerous water sources and also glaciers all make this territory perfect year round tur habitat. According to some locals and the Border Police, this is the only place in all Tusheti where female and male individuals are found together throughout the year. Elsewhere the males usually live separately from the females and keep to higher elevations most of the time. Breeding males are usually extremely vigilant and shy. They take shelter in very remote and naturally protected sections of the habitat because of which it is very difficult to observe them, especially in summer.

It can be concluded that the Atsunta ridge is probably one of the critical parts of the tur range due to the following: (i) typical tur habitats in this part of TPA cover a relatively large continuous area, (ii) the site appears to be preferred by turs because of the abundance of virtually inaccessible places and rugged terrain; if disturbed the animals can quickly rush out of sight and take shelter in the naturally protected sections, (iii) helicopter movement may be less intense and restricted by frequent poor visibility because of fog.

Results of direct observations and population numbers/density

We observed tur herds in the following gorges: Chigho Khaa (4 females), the Nartsapi pass (18 males on the first trip and 7 females and 1 young on the second trip), in Madnis Khorkhi (17 females and 2 males), Larovani (7 females), and Diklo Khaa (9 females). Also in Chesho we saw a very large herd. We could not count the individuals because they were out of sight very quickly. But there must have been no less than 50 individuals with the majority being females. But we noted a few large males too.

On the basis of the updated range and previously estimated density for Tusheti (2.26 individuals per square kilometre) we estimate the total Tusheti tur population at 750 individuals.

Daily activity

According to the camera trapping data turs appear to be most actively moving along the trails from 06:00 hrs to 08:00 hrs time period during July through September (see Figure 2 below.)

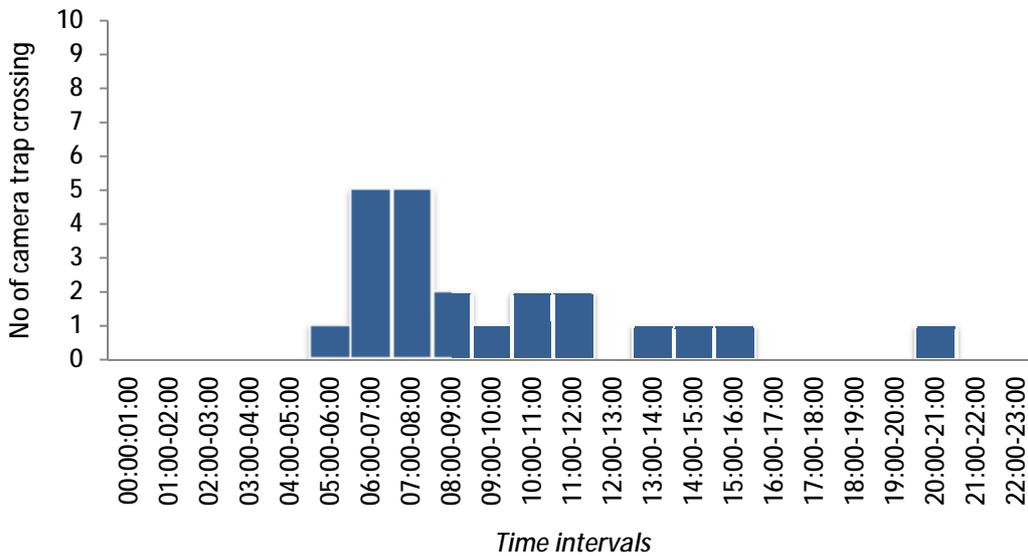


Figure 2. Tur daily activity on TPA based on camera trapping data obtained in July-September 2010.

4.3 Large carnivores and other mammals

In Tusheti, among the large carnivores there are gray wolf, Eurasian lynx and brown bear. Information on the presence of leopard has yet to be confirmed. We collected data on large carnivores by tracking and footprint identification as well as by camera trapping. In Tusheti animals rarely leave somewhat identifiable footprints on the substrate especially in the summer months. In the few sites where foot prints can potentially be found (e.g. in muddy places) livestock stabbing makes them totally indistinguishable. Therefore camera trapping usually is a more reliable technique to collect data on large carnivores.

During the surveys bear footprints were found in the forested section of the Gometsari gorge, in Tsovata (at 2900 m.a.s.l.), on a trail in the Borbalo pass (at 3000 m.a.s.l.) and at the sources of the Chighos Khaa 3140 m.a.s.l.). From the camera trapping data bears are more common in the Ighone area and the forests just above Kumelaurta. Bears were also recorded by the camera traps on mount Sonekha.

Wolf signs (tracks and scat) were noted in Gometsari gorge (on the road), Borbalo, Nartsapi pass and Chigho Khaa. Wolf photos were taken by the camera traps in Sonekha, Kumelaurta, Ighone, Tsitel Mta and Nartsapi pass.

From the recent data we conclude that both wolves and bears are more or less evenly distributed throughout Tusheti. However considering the low frequency of encounter of bear signs (tracks, scats and also bear photos on camera traps) during the field surveys the bear density in Tusheti is probably relatively low. There may be a number of reasons to that. One more or less obvious reason is natural; much of TPA, excluding relatively small Speroza section in the south-west, does not seem to be the best brown bear habitat.

No footprints or other signs of lynx were found during the surveys. But quite a number (16 in total) of lynx photos were taken by the camera traps in the mount Sonekha area and also in Ighone. The Ighone area appears particularly good habitat for lynx. According to the camera trapping data the site is rich in prey such as hare and roe deer.

Some evidence of leopard presence in Tusheti was first obtained during NACRES' 2004 field surveys. Leopard scratches on the ground were found on Ighone ridge. Since then no footprints or other signs have been documented. However unconfirmed reports on leopard sighting have appeared from time to time. According to the border police during 2000-2005 this animal was sighted three times in the Larovanis Tskali gorge at the confluence with the Kvakhidis Tskali. They also noted that some time in 2009 they heard a strange voice while on a patrol which they thought was a leopard. Some shepherds allegedly saw a leopard on the Atsunta pass in 2003. In 2004 one of the farms was attacked supposedly by a leopard near Larovani. During these surveys we were informed by the TPA rangers about a suspected leopard attack on livestock at mount Borbalo. We visited the site and interviewed the shepherds. However leopard involvement was not confirmed. Neither the surveys in general nor camera trapping could yield any further evidence of leopard presence in Tusheti (confirmed footprints or other signs or photos).

Unlike the previous efforts (Baseline Studies during 2003-2004), these surveys confirmed the presence of roe deer and wild boar in Tusheti. Roe deer are mostly found in the deciduous forest with a relatively mild relief and less rocky areas. Camera trap photos of roe deer were obtained on the Ighone and Chigho trails. No wild boar photos were taken but their tracks were recorded in the gorge between Ighone and Vestmovake, also in the flood planes of the Pirikita Alazani at village Chigho.

The obtained camera trap data also include photos of such species as badger, red fox, hare and marten. All of these animals are typical forest species but they may also venture up to

very high altitudes. For example, foxes, hares and martens were recorded by one of the camera traps on the Larovani pass as high as 3317 m.a.s.l.

Chamois are found in Tusheti but we did not record this species during our surveys. It is known that chamois are usually seen in the section from the Abano pass up to village Khiso. Because our survey had other priorities we did not investigate this section of Tusheti in detail. However as far as chamois is concerned the above mentioned sites should be surveyed first of all.

According to some reports there is a small population of red deer in Tusheti. Park rangers have seen red deer around villages Omalo and Shenako in winter and in Samkhevi in summer. During our surveys we did not obtain any credible information on red deer presence. We did not record any red deer or their foot prints. We installed one of the camera traps in the forest above village Kumelaurta that is where red deer had been sighted according to the locals. No red deer photo was obtained. In addition our last visit to those areas took place in October which is usually the peak of the red deer rut in Georgia. We did not hear any lowing. Hence we can not at this point confirm the presence of red deer in Tusheti.

4.4 Result of the ornithological survey

4.4.1 Results and analysis by survey routes

Village Zemo Alvani – village Omalo (along the main access road)

This route followed the main access road to Tusheti over the Abano pass. Notably the forest habitat along this transect is different from that in Tusheti. The section of the above road from Alvani to the Abano pass (southern slopes of the Greater Caucasus) are covered with deciduous forest. In Tusheti on the other hand the dominant forest types are the pine forest and birch forest. Hence on the route we also recorded bird species that are typical of deciduous forest. In total 21 species were recorded (Table 3). Among them were Georgian Red List species: Griffon Vulture (VU), Black vulture (EN) and Bearded vulture (VU). Other notable species include Caucasian Chiffchaff (*Phylloscopus lorenzii*⁸), the species of a small global distribution which together with Green Warbler (*Phylloscopus nitidus*) has a birdwatching importance. The Abano pass is situated at 2,926 m.a.s.l. and its surrounding areas feature typical Caucasian snowcock habitats e.g. the scree. However no snowcocks were observed during the survey.

Table 3: Bird species recorded on the Zemo Alvani – Omalo route

⁸ Some researchers consider this a subspecies of *Phylloscopus sindianus* (*Ph. s. lorenzii*).

#	Scientific name	Common name
1.	<i>Gyps fulvus</i>	Griffon Vulture
2.	<i>Aegypius monachus</i>	Eurasian Black Vulture
3.	<i>Gypaetus barbatus</i>	Bearded vulture
4.	<i>Falco tinnunculus</i>	Kestrel
5.	<i>Buteo buteo</i>	Common Buzzard
6.	<i>Parus major</i>	Great Tit
7.	<i>Merops apiaster</i>	Bee-eater
8.	<i>Motacilla cinerea</i>	Gray Wagtail
9.	<i>Motacilla alba</i>	White Wagtail
10.	<i>Anthus spinoletta</i>	Water Pipit
11.	<i>Phylloscopus nitidus</i>	Green Warbler
12.	<i>Phylloscopus lorenzii</i>	Caucasian Chiffchaff
13.	<i>Fringilla coelebs</i>	Chaffinch
14.	<i>Carduelis carduelis</i>	Goldfinch
15.	<i>Carduelis cannabina</i>	Linnet
16.	<i>Carduelis flavirostris</i>	Twite
17.	<i>Corvus corax</i>	Raven
18.	<i>Corvus corone</i>	Hooded Crow
19.	<i>Pyrrhocorax graculus</i>	Alpine Chough
20.	<i>Cinclus cinclus</i>	Cuckoo
21.	<i>Serinus pusillus</i>	Red-fronted Serin



The birdwatching potential of the Zemo Alvani – Omalo route

Visitors that are generally interested in birds may be offered to stop at a number of places along the road, which would also be short breaks along the rather tiring long way. During these breaks visitors will be given an additional opportunity to observe birds and maybe update their bird lists. On the pass, snowcocks can only be observed or heard during early hours or in the evening. If the purpose is to see or at least hear the snowcocks, the visitors would need to stay on the pass overnight. However considering the high altitude and associated poor visibility due to frequent fog and generally unpredictable weather conditions, not many visitors may wish to camp there. On the other hand one advantage of this site is that it is accessible by car. Overall the potential of this route in respect of birdwatching is generally lower compared to other sites in Tusheti.

Omalo and its surroundings

Omalo is situated on a plateau and is bordered by several gorges. There is a mosaic of forest and meadows that creates perfect habitat for birds including birds of prey. Therefore the village itself as well as its surroundings have a very diverse bird community. The list of bird species recorded in this site on several separate days throughout the survey is remarkably large and includes 54 species (Table 4). Among them are Georgian Red Listed species:

Griffon vulture (VU), Black vulture (EN), Bearded vulture (VU), Golden eagle (VU) as well as Caucasian Chiffchaff (*Phylloscopus lorenzii*) and Green Warbler (*Phylloscopus nitidus*) both of which are among the primary target species for birdwatchers visiting the Caucasus. Another such species, the Red-fronted Serin (*Serinus pusillus*) that breeds only in the mountains of the Caucasus, Turkey and Iran is one of the most common birds in Tusheti. In Omalo, very near guesthouse "Tusheti" (in 30 meters) we recorded a hobby's nest. Other birds of prey such as Sparrowhawk (*Accipiter nisus*) and Goshawks (*Accipiter gentilis*) are also often seen there. They apparently nest in the nearby pine forest.

Table 4. List of birds recorded in Omalo and its surroundings

#	Scientific name	Common name
1.	<i>Ardea cinerea</i>	Grey Heron
2.	<i>Gypaetus barbatus</i>	Bearded vulture
3.	<i>Aegypius monachus</i>	Eurasian Black Vulture
4.	<i>Gyps fulvus</i>	Griffon Vulture
5.	<i>Aquila chrysaetos</i>	Golden Eagle
6.	<i>Hieraetus pennatus</i>	Booted Eagle
7.	<i>Buteo buteo</i>	Common Buzzard
8.	<i>Accipiter gentilis</i>	Goshawk
9.	<i>Accipiter nisus</i>	Sparrowhawk
10.	<i>Falco tinnunculus</i>	Kestrel
11.	<i>Falco subbuteo</i>	Hobby
12.	<i>Alectoris chukar</i>	Chukar
13.	<i>Coturnix coturnix</i>	Quail
14.	<i>Vanellus vanellus</i>	Lapwing
15.	<i>Streptopelia turtur</i>	Turtle Dove
16.	<i>Cuculus canorus</i>	Cuckoo
17.	<i>Apus apus</i>	Swift
18.	<i>Upupa epops</i>	Hoopoe
19.	<i>Merops apiaster</i>	Bee-eater
20.	<i>Coracias garrulus</i>	Roler
21.	<i>Dendrocopos major</i>	Great Spotted Woodpecker
22.	<i>Hirundo rustica</i>	Barn Swallow
23.	<i>Delichon urbica</i>	House Martin
24.	<i>Anthus spinoletta</i>	Water Pipit
25.	<i>Anthus pratensis</i>	Meadow Pipit
26.	<i>Motacilla alba</i>	White Wagtail
27.	<i>Troglodytes troglodytes</i>	Wren
28.	<i>Prunella modularis</i>	Dunnock
29.	<i>Phoenicurus ochruros</i>	Black Redstart
30.	<i>Oenanthe oenanthe</i>	Northern Wheatear
31.	<i>Turdus merula</i>	Blackbird
32.	<i>Turdus torquatus</i>	Ring Ouzel
33.	<i>Sylvia curruca</i>	Lesser Whitethroat
34.	<i>Phylloscopus trochilus</i>	Willow Warbler

35.	<i>Phylloscopus nitidus</i>	Green Warbler
36.	<i>Phylloscopus lorenzii</i>	Caucasian Chiffchaff
37.	<i>Parus major</i>	Great Tit
38.	<i>Parus ater</i>	Coal Tit
39.	<i>Parus caeruleus</i>	Blue Tit
40.	<i>Aegythalos caudatus</i>	Long-tailed Tit
41.	<i>Certhia familiaris</i>	Treecreeper
42.	<i>Lanius minor</i>	Lesser Gray Shrike
43.	<i>Lanius collurio</i>	Red-backed Shrike
44.	<i>Garrulus glandarius</i>	Jay
45.	<i>Corvus corone</i>	Hooded Crow
46.	<i>Corvus corax</i>	Raven
47.	<i>Oriolus oriolus</i>	Golden Oriol
48.	<i>Fringilla coelebs</i>	Chaffinch
49.	<i>Carduelis carduelis</i>	Goldfinch
50.	<i>Carduelis cannabina</i>	Linnet
51.	<i>Serinus pusillus</i>	Red-fronted Serin
52.	<i>Pyrrhula pyrrhula</i>	Bullfinch
53.	<i>Loxia curvirostra</i>	Common Crossbill
54.	<i>Emberiza hortulana</i>	Ortolan Bunting



The birdwatching potential of Omalo and surrounding areas

It is important to note that any visitor to Tusheti could see as many as 50 different species of birds without travelling far from Omalo. Among the birds that can be observed with high probability are not only birds of prey and vultures (griffon and black vultures, bearded vulture, etc) but also three of the birdwatching target species Caucasian chiffchaff, Green warbler and Red-fronted Serin.

Omalo – Tsitel Mta

Only 14 species of birds were recorded on this route (Table 5). Based on this information and also considering the homogeneity of the habitat (the site is largely covered with pine forest) this section of the protected area does not appear to be rich in birds.

Table 5: Bird species recorded on the Omalo-Tsitel Mta route

#	Scientific name	Common name
1.	<i>Gyps fulvus</i>	Griffon Vulture
2.	<i>Hieraetus pennatus</i>	Booted Eagle
3.	<i>Buteo buteo</i>	Common Buzzard
4.	<i>Alectoris chukar</i>	Chukar
5.	<i>Dendrocopos major</i>	Great Spotted Woodpecker

6.	<i>Motacilla alba</i>	White Wagtail
7.	<i>Anthus spinoletta</i>	Water Pipit
8.	<i>Anthus pratensis</i>	Meadow Pipit
9.	<i>Phoenicurus ochruros</i>	Black Redstart
10.	<i>Parus ater</i>	Coal Tit
11.	<i>Parus major</i>	Great Tit
12.	<i>Pyrrhula pyrrhula</i>	Bullfinch
13.	<i>Serinus pusillus</i>	Red-fronted Serin
14.	<i>Garrulus glandarius</i>	Jay



The birdwatching potential of Omalo-Tsitel Mta section

The route is rather difficult and many birdwatchers may not want to walk and carry the typical birdwatching gear (scope, tripod, etc) along this rocky trail. The bird diversity that can be seen here is not remarkable. However the section from Omalo to "Kue" (where interpretation boards are located) could still be developed as a birdwatching trail. Visitors may have an opportunity to first observe smaller breeding birds such as passerines, then proceed to Kue and observe bearded and griffon vultures from the Kue observation point. These birds are often seen perching on the rocks on the Samekhe (Sonekhe) hillside just opposite the Kue observation point (preferred perching rocks can be easily distinguished by white spots of birds' droppings).

Omalo – lake Oreti

Omalo-lake Oreti is one of the most popular visitor trails in Tusheti. The main attraction of this trail is the spectacular scenery and views which are so wide that almost all of Tusheti can be seen. A total of 18 bird species were recorded on this route (Table 6). More importantly the site includes typical habitats of two endemic birds Caucasian Black Grouse (*Tetrao mlokosiewiczii*) and Caucasian Snowcock (*Tetraogallus caucasicus*). Hence the section (trail) have both conservation and potential tourist values.

Table 6: Bird species recorded on the Omalo-lake Oreti route

#	Scientific name	Common name
1.	<i>Gyps fulvus</i>	Griffon Vulture
2.	<i>Gypaetus barbatus</i>	Bearded vulture
3.	<i>Aquila chrysaetos</i>	Golden Eagle
4.	<i>Buteo buteo</i>	Common Buzzard
5.	<i>Falco tinnunculus</i>	Kestrel
6.	<i>Tetraogallus caucasicus</i>	Caucasian Snowcock
7.	<i>Alectoris chukar</i>	Chukar
8.	<i>Coturnix coturnix</i>	Quail

9.	<i>Merops apiaster</i>	Bee-eater
10.	<i>Upupa epops</i>	Hoopoe
11.	<i>Motacilla cinerea</i>	Grey Wagtail
12.	<i>Anthus spinoletta</i>	Water Pipit
13.	<i>Phylloscopus nitidus</i>	Green Warbler
14.	<i>Oenanthe oenanthe</i>	Northern Wheatear
15.	<i>Parus ater</i>	Coal Tit
16.	<i>Carduelis flavirostris</i>	Twite
17.	<i>Fringilla coelebs</i>	Chaffinch
18.	<i>Pyrrhonorax pyrrhonorax</i>	Chough



The birdwatching potential of the Oreti lake area

*The ornithological importance of the lake Oreti area in addition to the birds commonly found in Tusheti (e.g. large raptors) is primarily associated with the two endemic species Caucasian Black Grouse (*Tetrao mlokosiewiczi*) and Caucasian Snowcock (*Tetraogallus caucasicus*). However it is very difficult to observe black grouses during the main tourist season in Tusheti, the summer. The best time to observe black grouses in the Caucasus is when they have lek that is in April to May. In summer these birds are largely invisible most of the time as they are mostly confined to the Caucasian Rhododendron (*Rhododendron caucasicum*) shrubbery. Therefore in respect of black grouse observations this site (as well as the whole of Tusheti) has a very limited potential. The snowcocks on the other hand can easily be observed in the scree just above lake Oreti. Snowcocks are usually active during the early hours as well as in the evening, during which time they can be observed as well as listened to. Visitors that are interested in seeing these birds should be advised to camp at the lake and the next morning walk up the hill above the lake to maximise their chances. One of the advantages of this site is that visitors may go quite near the birds without disturbing them. There are also chances of observing golden eagles hunting the snowcocks.*

The meadows around the lake are intensely used for livestock movement and grazing. Both sheep and sheep dogs disturb the birds. If this disturbance could be removed or at least reduced chances of observing the snowcocks would increase significantly.

In summary, the Oreti lake area is one of the best sites in Tusheti for observing Caucasian Snowcocks and also other birds due to the following two reasons: (1) the site is not very far from Omalo and (2) combined with the spectacular scenery and views this route can offer one of the best visitor experiences.

Omalo-Atsunta

Omalo-Atsunta was one of the main routes for the ornithological assessment. It was selected because (1) it goes through one of the longest gorges in Tusheti and the survey would yield valuable information on the birds of not only this particular gorge but also on

that of all Tusheti, and (2) the trail is popular among the visitors and is used for going from Tusheti over to Khevsureti and *vice versa*.

In total 34 bird species were recorded (Table 7) including Georgian Red Listed species: Griffon vulture (VU), Black vulture (EN), Bearded vulture (VU), Golden eagle (VU), also Caucasian Chiffchaff (*Phylloscopus lorenzii*), Green Warbler (*Phylloscopus nitidus*), and Caucasian Snowcock (*Tetraogallus caucasicus*). Even more importantly at the Atsunta pass we recorded Great Rosefinch (*Carpodacus rubicilla*). This was a new species for Tusheti. The finding is important in that it contributes not only to the existing bird list of Tusheti but also to better understanding of the bird fauna of Georgia/the Caucasus. The scientific and conservation interest of this species is mainly associated with its rather peculiar global distribution. This is a Central Asian bird and outside this Region it is only found in the Caucasus. Hence the great interest to this species among the birdwatchers visiting Georgia.

Table 7: Bird species recorded on the Omalo-Atsunta route

#	Scientific name	Common name
1.	<i>Aegypius monachus</i>	Eurasian Black Vulture
2.	<i>Alectoris chukar</i>	Chukar
3.	<i>Anthus spinoletta</i>	Water Pipit
4.	<i>Aquila chrysaetos</i>	Golden Eagle
5.	<i>Buteo buteo</i>	Common Buzzard
6.	<i>Carduelis cannabina</i>	Linnet
7.	<i>Carduelis flavirostris</i>	Twite
8.	<i>Carpodacus erythrinus</i>	Common Rosefinch
9.	<i>Carpodacus rubicilla</i>	Great Rosefinch
10.	<i>Cinclus cinclus</i>	Dipper
11.	<i>Corvus corax</i>	Raven
12.	<i>Falco subbuteo</i>	Hobby
13.	<i>Falco tinnunculus</i>	Kestrel
14.	<i>Gypaetus barbatus</i>	Bearded vulture
15.	<i>Gyps fulvus</i>	Griffon Vulture
16.	<i>Lanius collurio</i>	Red-backed Shrike
17.	<i>Merops apiaster</i>	Bee-eater
18.	<i>Motacilla alba</i>	White Wagtail
19.	<i>Motacilla cinerea</i>	Grey Wagtail
20.	<i>Oenanthe oenanthe</i>	Northern Wheatear
21.	<i>Perdix perdix</i>	Grey Partridge
22.	<i>Phoenicurus ochrurus</i>	Black Redstart
23.	<i>Phylloscopus lorenzii</i>	Caucasian Chiffchaff
24.	<i>Phylloscopus nitidus</i>	Green Warbler
25.	<i>Phylloscopus trochilus</i>	Willow Warbler
26.	<i>Ptyonoprogne rupestris</i>	Crag Martin
27.	<i>Pyrrhocorax pyrrhocorax</i>	Chough
28.	<i>Saxicola rubetra</i>	Whinchat

29.	<i>Serinus pusillus</i>	Red-fronted Serin
30.	<i>Sylvia communis</i>	Whitethroat
31.	<i>Tetraogallus caucasicus</i>	Caucasian Snowcock
32.	<i>Turdus viscivorus</i>	Mistle Thrush
33.	<i>Tychodroma muraria</i>	Wallcreeper
34.	<i>Upupa epops</i>	Hoopoe



The birdwatching potential of the Atsunta pass

Atsunta is one of the most attractive sites for visitors for a number of reasons and the popular trail going over to Khevsureti also passes through this area. The birdwatching potential should be considered only in combination with other features and purposes because the trail is too long and tiring to develop it as a separate birdwatching route. Nevertheless in addition to other birds the chances of spotting Caucasian snowcocks and Great rosefinches should still attract visitors who are generally interested in birds. If observing birds is a primary purpose the route may be planned so that it becomes less tiring for the visitors. For example:

Day 1. Drive from Omalo to Ghirevi. From Ghirevi to the foot of Atsunta by horses. Overnight at camp site.

Day 2. Early morning walk to Atsunta to observe birds. Return to the camp before dark. Overnight at camp site.

Day 3. Observe birds around the camp site at dawn. Leave for Ghirevi by horses. From Ghirevi drive back to Omalo.

NB. The pass is at 3,400 meters above sea level. The weather can be unpredictable, visibility is affected by frequent rain and fog. Hence observation time may be extremely limited.

Omalo - Borbalo

Omalo –Borbalo is another very popular route among the visitors of TPA. Most visitors use this trail to go over to Pshavi or to Pirikita Khevsureti. The route is also rather long. For the purpose of ornithological assessment it was divided into two sections: (1) Omalo to Alaznistavi up to the so called Finnish cottage and (2) Alaznistavi-Borbalo. Birds recorded on each of these sections are shown in tables below (Tables 8 and 9).

The right shoulders of the Tusheti Alazani gorge from Sajichvle ridge to Sakorne represent typical black grouse habitats. No birds were spotted despite that the trail trespasses the grouse habitat (as mentioned above the timing was not good for spotting these birds). However we could still confirm the presence of black grouses since we found their droppings. Local shepherds also confirmed the presence of black grouses in the area. Caucasian snowcocks were not recorded but we noted the presence of their habitat, scree on the tops of the hills.

Table 8. Bird species recorded on the Omalo-Alaznistavi section

#	Scientific name	Common name
1.	<i>Gyps fulvus</i>	Griffon Vulture
2.	<i>Gypaetus barbatus</i>	Bearded vulture
3.	<i>Aquila chrysaetos</i>	Golden Eagle
4.	<i>Buteo buteo</i>	Common Buzzard
5.	<i>Accipiter gentilis</i>	Goshawk
6.	<i>Accipiter nisus</i>	Sparrowhawk
7.	<i>Falco tinnunculus</i>	Kestrel
8.	<i>Falco subbuteo</i>	Hobby
9.	<i>Alectoris chukar</i>	Chukar
10.	<i>Ptyonoprogne rupestris</i>	Crag Martin
11.	<i>Cinclus cinclus</i>	Dipper
12.	<i>Motacilla cinerea</i>	Grey Wagtail
13.	<i>Anthus spinoletta</i>	Water Pipit
14.	<i>Phylloscopus nitidus</i>	Green Warbler
15.	<i>Loxia curvirostra</i>	Common Crossbill
16.	<i>Serinus pusillus</i>	Red-fronted Serin
17.	<i>Carduelis cannabina</i>	Linnet
18.	<i>Carduelis flavirostris</i>	Twite
19.	<i>Corvus corax</i>	Raven

Table 9. Bird species recorded on the Alaznistavi-Borbalo section

#	Scientific name	Common name
1.	<i>Gyps fulvus</i>	Griffon Vulture
2.	<i>Aegypius monachus</i>	Eurasian Black Vulture
3.	<i>Gypaetus barbatus</i>	Bearded vulture
4.	<i>Aquila chrysaetos</i>	Golden Eagle
5.	<i>Falco tinnunculus</i>	Kestrel
6.	<i>Alectoris chukar</i>	Chukar
7.	<i>Cinclus cinclus</i>	Dipper
8.	<i>Motacilla cinerea</i>	Grey Wagtail
9.	<i>Anthus spinoletta</i>	Water Pipit
10.	<i>Serinus pusillus</i>	Red-fronted Serin
11.	<i>Carduelis cannabina</i>	Linnet
12.	<i>Carduelis flavirostris</i>	Twite
13.	<i>Carpodacus erythrinus</i>	Common Rosefinch
14.	<i>Corvus corax</i>	Raven



The birdwatching potential of Alaznistavi-Borbalo section

Omalo-Borbalo route is popular among the visitors. But some visitors may find it rather long and exhausting. It may be planned so that it creates better opportunities for visitors to enjoy the scenery and observe the local wildlife. The birds that can be seen include generally attractive species such as large raptors and also Caucasian

black grouses that appear to be quite common but as mentioned above they are extremely difficult to spot during the main tourist season. Only especially lucky visitors may get a chance to see these birds during the summer. Therefore the route has a limited potential to attract birdwatchers. But the bird diversity that can be observed in general is an important asset of the route.

Omalo-Diklo

The ornithofauna of the Omalo-Diklo section expectedly was not found to be different from what was already recorded for Omalo in general.

4.4.2 An overview of the bird diversity of Tusheti

Using the new findings we updated the previous bird list for Tusheti. The new list includes 88 bird species (Appendix 2) which is an impressive result for Tusheti as the number is nearly a third of all bird species found in the country. It is also notable that the recent survey was only the second bird inventory in Tusheti (the first inventory was conducted by NACRES in 2003-2004 under the GPADP). The previous bird list included 57 species and it has been updated by 31 new species. This list is likely to become significantly longer if ornithological surveys continue, especially if future surveys can be conducted during high bird migration (e.g. in October).

According to the new bird species list, in Tusheti there are six species included in the Georgian Red List (Table 10), among them is Black Vulture (*Aegypius monachus*) that is included in the IUCN Red List as Near Threatened (NT). Tusheti is remarkably rich in large birds. Such species as Goshawk, Sparrowhawk, Kestrel, Griffon Vulture, etc. are common. There are also almost all the Georgian bird species that are important for international birdwatching (Table 10). The highlight of the bird survey undoubtedly was the finding of Great Rosefinches (*Carpodacus rubicilla*) on the Atsunta pass. As mentioned above this species has an interesting global distribution and outside its main range in Central Asia it is only found in the Caucasus as an isolated population.

Table 10. Birds of special interest

#	Scientific name	Common name	Legal status		Importance to Birdwatching
			Geo Red list	IUCN Red list	
1.	<i>Gypaetus barbatus</i>	Bearded vulture	VU		
2.	<i>Gyps fulvus</i>	Griffon Vulture	VU		
3.	<i>Aegypius monachus</i>	Eurasian Black Vulture	EN	NT	
4.	<i>Aquila chrysaetos</i>	Golden Eagle	VU		
5.	<i>Tetrao mlokosiewiczi</i>	Caucasian Black Grouse	VU	DD	+
6.	<i>Tetraogallus Caucasicus</i>	Caucasian Snowcock			+
7.	<i>Phylloscopus lorenzii</i>	Caucasian Chiffchaff			+
8.	<i>Phylloscopus nitidus</i>	Green Warbler			+
9.	<i>Serinus pusillus</i>	Red-fronted Serin			+
10.	<i>Carpodacus rubicilla</i>	Great Rosefinch	VU		+

4.4.3 Important bird areas in Tusheti

The survey confirmed the expectation that Tusheti is in general rich in bird species. The local ornithofauna includes a number of species of conservation and/or tourist interest. There are also certain specific sites that have special importance in respect of bird conservation and nature-based tourism potential. Such sites are: (1) the Atsunta pass as a Great Rosefinch nesting area, (2) the lake Oreti area, the nearby scree as Caucasian snowcock habitat, and (3) Samekhe hillsides as vulture perching site that can be observed from the Kue observation point (Appendix 1; Map 3)

The above sites should be considered in the management planning process (i.e. in the development of TPA management plan and reclassification, tourism planning) and they may also require special attention in the actual management of the protected area.

4.5 The distribution of forest and meadow habitats

4.5.1 The distribution of alpine and subalpine meadows

For the purpose of this assessment we consider as meadow habitat all the open land in Tusheti excluding bare rock, scree and glaciers. Using remote sensing technologies and GIS analysis we updated the meadow habitat distribution map that was previously prepared based on the 2003-2004 baseline surveys (Appendix 1; Map 4).

The meadow is the main element of the landscape in Tusheti. It covers 60,447 ha according to the new map. This is considerably smaller than the previously calculated area, 70,000 ha.

Notably the old estimate was not based on remote sensing technologies, which explains the big difference between the two figures⁹.

The meadow was defined as more or less large areas that were covered with vegetation but were not forest or shrub excluding smaller openings in the forest or shrubbery. In reality the meadows in Tusheti are very diverse and are composed of at least three distinct plant communities such as mezophile alpine meadow, so called "alpine moles" and subalpine tall grass communities¹⁰. However defining the meadow habitat disregarding its diversity is also appropriate for management purposes. This habitat encompasses all the open land in Tusheti i.e. pastures regardless their current use status (the pasture use pattern may change in Tusheti from year to year).

4.5.2 The distribution of forest habitats

On the basis of the Tusheti Land Cover map we created a new updated map of forests (Appendix 1; Map 5). There are three main types of forest in Tusheti: pine (*Pinus kochiana*), birch (*Betula pendula*, *B. litwinowii*, more rarely *B. raddeana*), and deciduous (mostly beech, *Fagus orientalis*). The latter is found on a relative small area (2,798 ha) in the south-west of TPA (Pankisi gorge section).

Notably in some parts there is no definite boundary between the pine and birch forest. Instead there are intermediary forest communities. Therefore to some extent this classification is arbitrary.

According to the new distribution maps the pine forest in Tusheti covers 12,404 ha and the birch forest covers 10,188 ha.

Further studies are needed to clarify the situation with intermediary forest communities.

4.5.3 Sacred forest in Tusheti

In addition to cultural and religious values many sacred sites may also have a great conservation importance. Therefore any conservation initiative (including protected area planning and management) should fully consider and utilise sacred sites and their local and

⁹ High resolution satellite imagery for Tusheti was purchased by the Georgia Protected Areas Development Project (WB/GEF) after the baseline studies were completed. So the baseline studies did not have access to satellite images and habitat mapping had to rely on other means such as existing topographic maps and ground observations.

¹⁰ Detailed description of these plant communities can be found in *TPA Management Plan 2006* and in NACRES' *Biodiversity Baseline Studies Report, 2004*.

national importance and the benefits they may bring to biodiversity conservation. Sacred forests that are found in Tusheti and elsewhere in the high mountains of Georgia are a classical example of a sacred site that has both religious and conservation values. Typically sacred forests in Georgian mountains are almost intact forest stands often distinguished by high aesthetic value and rich biodiversity. Sacred forests may also represent an example of local forest that has avoided any major human influence completely or over a long period of time. Hence however small any sacred forest may still be important for conservation.

As part of the biodiversity assessment surveys the first steps toward sacred forest inventory was conducted by selected local community representatives. The work was strongly supported by the TPA administration. A total of 10 sacred forest sites were recorded throughout Tusheti (results are summarised in Table 11) and a primary map was created (Appendix 1; Map 6). Further work needs to be done primarily to study the species composition and to create more detailed maps. It would also be interesting to conduct comparative studies i.e. to compare sacred forest to other exploited parts of the forest habitat.

Table 11. Sacred forest sites in Tusheti

#	Location	Name of religious sites	Geographical coordinates ¹¹	Altitude (m.a.s.l.)	Approximate size (meters)
	Village Shenako	Ageurta	0555255 4690498	1,868	200X200
	Village Shenako	Tsasne	0555130 4690850	1,832	100X100
	Village Shenako	Kurekhi	0555218 4691733	2,018	100X200
	Village Diklo	Bichekhi	0557849 4694484	2,215	100X200
	Sanare	Shuamta	0555107 4693905	2,449	100X100
	Village Chigho	Lashari	0553344 4695022	2,016	400X500
	Village Chigho	Tursiekhi	0552747 4695799	2,110	100X200
	Village Dartlo	lakhsari	0547909 4698568	1,940	200X300
	Village Kumelaurta	Shapura	0551924 4688558	2,200	200X200
	Village Kumelaurta	Khakha	0551919 4688548	2,180	100X100

¹¹ These are Pulkovo coordinates

4.6 Invertebrates: butterflies

Very little is known about the invertebrate fauna of Tusheti. A rapid assessment of invertebrates and especially of insects should be considered as one of the research priorities for Tusheti. This information is expected to have both conservation and scientific importance. In addition to scientific and conservation values butterflies may also have importance for tourism development.

We gathered some data on this group of insects. This was by no means an inventory but rather a by-product of our studies that had other primary objectives. Nevertheless a very superficial assessment was sufficient to yield very interesting findings that have potential scientific, conservation and even tourist importance.

First, it should be noted that the peak flowering period is probably July for most of Tusheti. Nevertheless the diversity and abundance of butterflies was still remarkable in August. Such butterflies as Swallowtail (*Papilio machaon*), Red admiral (*Vanessa atalanta*), Painted Lady (*Vanessa cardui*) and Small Tortoiseshell (*Aglais urticae*) were abundant in all Tusheti. At village Dartlo, near lake Oreti and also at Sajinchvle ridge we found the rare Mountain Apollo (*Parnassius apollo*). This species is included in the Georgian as well as IUCN Red Lists (VU),

is on Appendix II of CITES¹² and Annex IV of Habitats Directive¹³. Near mount Borbalo we recorded the endangered endemic Caucasian Apollo - *Parnassius nordmanni*, which is typically found in very high altitudes. This species has a small fragmented range in the country and is included in the Georgian Red List (EN).

5 Potential of nature-based tourism in Tusheti

5.1 Wildlife watching: Mammals

We used the following main criteria to evaluate the potential of wildlife watching in Tusheti:

1. What species are found in Tusheti and what is their potential tourist value
2. The possibility of viewing the wild animals in general and during the main tourist season
3. What is the probability of spotting the target species
4. What would be the difficulty level of potential wildlife viewing trails
5. What are the potential risks and benefits to the target species and biodiversity in general
6. What is the initial cost of setting up and operation of wildlife watching trails.

¹² The Convention on International Trade in Endangered Species of Wild Fauna and Flora

¹³ Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora

First, it should be noted that Tusheti is rich in mammal species that have potential tourist value. Almost all carnivores that are found in Georgia (and the Caucasus) are also found in Tusheti. The same is basically true for ungulates too. In addition Tusheti has the only more or less viable wild goat population in Georgia.

The potential of wildlife watching in respect of large carnivores is extremely limited in Tusheti and indeed in all Georgia. These animals are typically nocturnal while in Georgia they are particularly shy due to active persecution by people. Hence it may be only by chance that a visitor sees a wolf or a bear in Tusheti. Bears are normally relatively easier to spot in spring that is outside of the main tourist season for Tusheti. Large carnivore footprints are also very difficult to find in Tusheti as most of the places in which footprint can potentially be left are also heavily stabbed by livestock¹⁴. In general livestock grazing and associated factors (e.g. sheep dogs) and other human influences (e.g. helicopters) are major disturbance to large mammals in Tusheti. These factors affect the spatial distribution of these animals and significantly diminish the possibility of their observation. We found that both wild goats and tur immediately react by fleeing to the sound of a flying helicopter. It appears that for them helicopters are still associated with a serious danger (shooting). For ensuring high probability of viewing large mammals it is not only important to understand their movement and distribution patterns but also how these are affected by various human factors. At present it is not known how exactly helicopter flights effect the daily movement patterns in the wild goats and tur. It is quite possible that these animals are very sensitive to this and other disturbance. If disturbed in a particular site they may move elsewhere and not reappear for some time. All of this is likely to create problems to wildlife watching tourism.

In respect of ungulates, wild goat and tur are primary target species for nature-based tourism. However tur has a limited potential in Tusheti as far as wildlife watching is concerned. These animals typically remain in very high altitudes, in remote and not easily accessible areas during the summer months. During this period a tur viewing trip (i) would involve a long and difficult trail to get to the tur habitats, and (ii) would be minimum 2-days long since turs are relatively easy to see during early morning hours. Some visitors may still choose one of these trips. But it is notable that other protected areas such as Lagodekhi and Kazbegi have a significantly higher potential of tur viewing.

On the other hand wild goat watching has many advantages:

¹⁴ As compared to Tusheti, Vashlovani national park has a significantly higher large carnivore viewing potential. There it is much easier to spot animals or at least find their footprints. Many visitors may find it exiting to see fresh footprints of wolf, bear, leopard and lynx.

- There are several places in Tusheti from which wild goats may be observed early in the morning and in the evening throughout summer.
- All the potential observation points are easily accessible; one of them is at village Omalo.
- The probability of observing wild goats is generally quite high.
- Wild goats would be observed from a distance using scope or binocular, and with the aid of specialist equipment they can be filmed too.
- Observing the wild goats from specially designated and organised observation points and with certain rules would not have any impact on the animals (this also means that the animals may be observed for extended periods of time)
- Wild goat observation would not require any special measures such as organising feeding sites, salt leaks etc. Visitors would be able to observe wild goats in their natural environment, on the forest openings, meadows and rocks or scree.

The above demonstrates that the wild goat has the greatest potential for wildlife watching development in Tusheti. However certain measures need to be taken for the successful development of wild goat watching and a number of very important conditions must be met to ensure that the activity is ecologically friendly. These may include:

- Strict protection of the sites and the species
- Set up and implement an effective wild goat monitoring scheme
- Closely monitor visitor numbers and evaluate potential impact on the species as well as on other biodiversity
- Provide relevant training for the guides and rangers
- Provision of necessary equipment
- Establish visitor behaviour rules at the observation points and strictly enforce them
- Advertise the wild goat watching as one of the tourist products offered by TPA and organise relevant information materials (publications, maps, interpretation boards, etc.)
- Organise observation points to make the viewing more comfortable and enjoyable (e.g. build a small deck, etc).

The best sites for organising observation points for wild goat watching include Kue, Keseloebi, and Kvemo Omalo.

The development of wild goat watching tourism may have a positive influence on the conservation status of this species as it may increase the value of this species among the local communities as well as among the decision makers at the national level. Also visitors

may be involved in wild goat monitoring. Many visitors may find it exciting to count the animals, fill out special forms and thus contribute to the monitoring.

5.2 *Birdwatching*

For the evaluation of the birdwatching potential of TPA it is important to determine what is meant by the term “birdwatching” and who are the target group of visitors. To this end we should distinguish two categories of potential visitors:

1. People who are seriously interested in birds i.e. birdwatchers or birders
and
2. People who are generally interested in nature and all wildlife including birds.

The first category includes people for whom “watching and hearing birds” is a serious hobby so that they are prepared to devote to this activity a considerable amount of their time and money. Birdwatching became especially popular in 1960s and it is now a major form of nature-based tourism. It is very popular in Western European countries such as UK, Holland, Belgium, Sweden, etc, also in USA, Japan and etc. Today birdwatchers travel all around the globe to update their personal checklists of bird species and at the same time often gather valuable information. Correspondingly in many countries there are tour operators that specialise on catering this clientele.

A typical birdwatcher would be equipped with a field guide and at least one pair of binoculars. Many also carry a spotting scope.

Not surprisingly the majority of the birdwatchers are middle-aged or older people. Updating personal check lists of the seen birds naturally require much travelling that is both costly and time-consuming. This is one of the main reason why birdwatchers are typically very different from ordinary visitors that wish to spend time in nature. The birdwatchers’ motto is to see maximum number of birds with minimum effort, time and money.

With what purpose and from which countries do birdwatchers come to Georgia?

Most of the birdwatchers that Georgia receives are from western Europe. Their primary purpose is to see Caucasian endemic birds. No birdwatcher’s check list for the Western Palaearctic (Europe, Middle East and North Africa) can be complete without visiting Georgia or the Caucasus to see the Caucasian endemics and other bird species whose global range is primarily the Caucasus. Such birds include:

1. Caucasian Snowcock – Endemic of the Greater Caucasus
2. Caucasian Black Grouse – Endemic to the Caucasus
3. Caucasian Chiffchaff – Breeds in the Caucasus, Turkey and Iran. The Caucasus is probably the largest part of the range.
4. Green Warbler – Found in the Caucasus, Northern Turkey and Iran. The Caucasus is probably the largest part of the range.
5. Great Rosefinch – The Caucasus is the easternmost part of the range.
6. Gldenstdt's Redstart - The Caucasus is the easternmost part of the range
7. Red-fronted Serin - Found in the Caucasus, Northern Turkey and Iran. The Caucasus is probably the largest part of the range.
8. Krper's Nuthatch – Has a small global distribution that includes parts of Greece, Turkey and the Caucasus.

Apart from the above species, the birdwatchers coming to Georgia are also attracted by the birds that have already become rare in much of Europe. Many such species are still very abundant in Georgia. These primarily include: Hoopoe, Crested Lark, European Bee-eater, Roller, Lesser Gray Shrike, Corn Bunting, etc. In addition all four European vultures are found in Georgia. Seeing any of these large birds always brings an excitement to any birdwatcher or ordinary visitor. But they can not be regarded as target species for birdwatchers. There are places in Europe where these vultures are numerous and easily seen.



Red-fronted Serin (Photo: G. Drachiashvili)

In addition to specific species, birdwatchers are also attracted to Georgia by the opportunity to witness one of the biggest raptor migration in all Eurasian continent. The best place to observe this migration is at the Black Sea coast near Batumi.

Below we evaluate the birdwatching potential of Tusheti according to certain criteria:

<i>Target species</i>	According to the available information 6 of the 8 target bird species are found in Tusheti including: Caucasian snowcock, Caucasian Black Grouse, Caucasian Chiffchaff, Green Warbler, Great Rosefinch and Red-fronted Serine.
<i>Possibility of seeing the target species</i>	The Great Rosefinch appears to be rare in Tusheti and only breeds in remote areas; in April and May during which time Black grouses are typically easier to observe, Tusheti is inaccessible; Snowcocks are relatively easy to observe but this would require a long walk or ride to get to the sites. Other target species are common in Tusheti.
<i>The probability of seeing the target species</i>	Among the main target species visiting birdwatchers may be guaranteed to see Caucasian chiffchaffs, Green warblers, and Red-fronted series. There is a high probability of seeing Caucasian Snowcocks and Great Rosefinches too provided the visitor is prepared to devote sufficient effort to get to the sites. Spotting a Caucasian black grouse will be totally up to a chance.
<i>Access road and transportation within the PA; distance from the capital</i>	The distance from Tbilisi to Tusheti is only 220 km. However the road is difficult and is only open in the summer months (any future air travel is also likely to be confined to this season). This means that during the best birdwatching time for Georgia Tusheti is largely inaccessible. Some birdwatchers may not be prepared to walk or ride a horse on long distances to reach some of the best birdwatching sites within Tusheti.

It is important to note that individual birdwatchers and travel agents always conduct a similar evaluation for any potential country or site, and may investigate other details too. In any case their choice always leans toward the country/site where chances are bigger to see maximum number of target species with minimum effort, time and money.

Considering all of the above, we conclude that the potential of birdwatching for Tusheti is limited. Tusheti could not compete with other sites within the country. For example Kazbegi

offers almost everything a birdwatcher would want¹⁵ and has been a prime birdwatching destination in all Georgia for many years.

On the other hand the possibility of observing many endemic, rare or otherwise notable bird species in Tusheti should be promoted to attract visitors with wider interests (Category 2 visitors above). The “bird observation” element would significantly enrich the overall visitor experience.

5.3 Butterflies

The abundance and diversity of butterflies is remarkable in Tusheti. Special insect surveys need to be conducted as almost nothing is known about this or other invertebrate fauna of the region. However, even a very superficial assessment has shown that some very interesting butterfly species are found in Tusheti. The noteworthy species include the rare Apollo (*Parnassius apollo*), and the endangered endemic Caucasian Apollo (*Parnassius nordmanni*). Future studies will certainly reveal many more interesting species but it is already clear that butterfly abundance and diversity can be one of the attractions for visitors in Tusheti. Notably many travel agents offer combined bird and butterfly tours. As the summer progresses birds become more difficult to observe while butterflies on the contrary become more abundant.

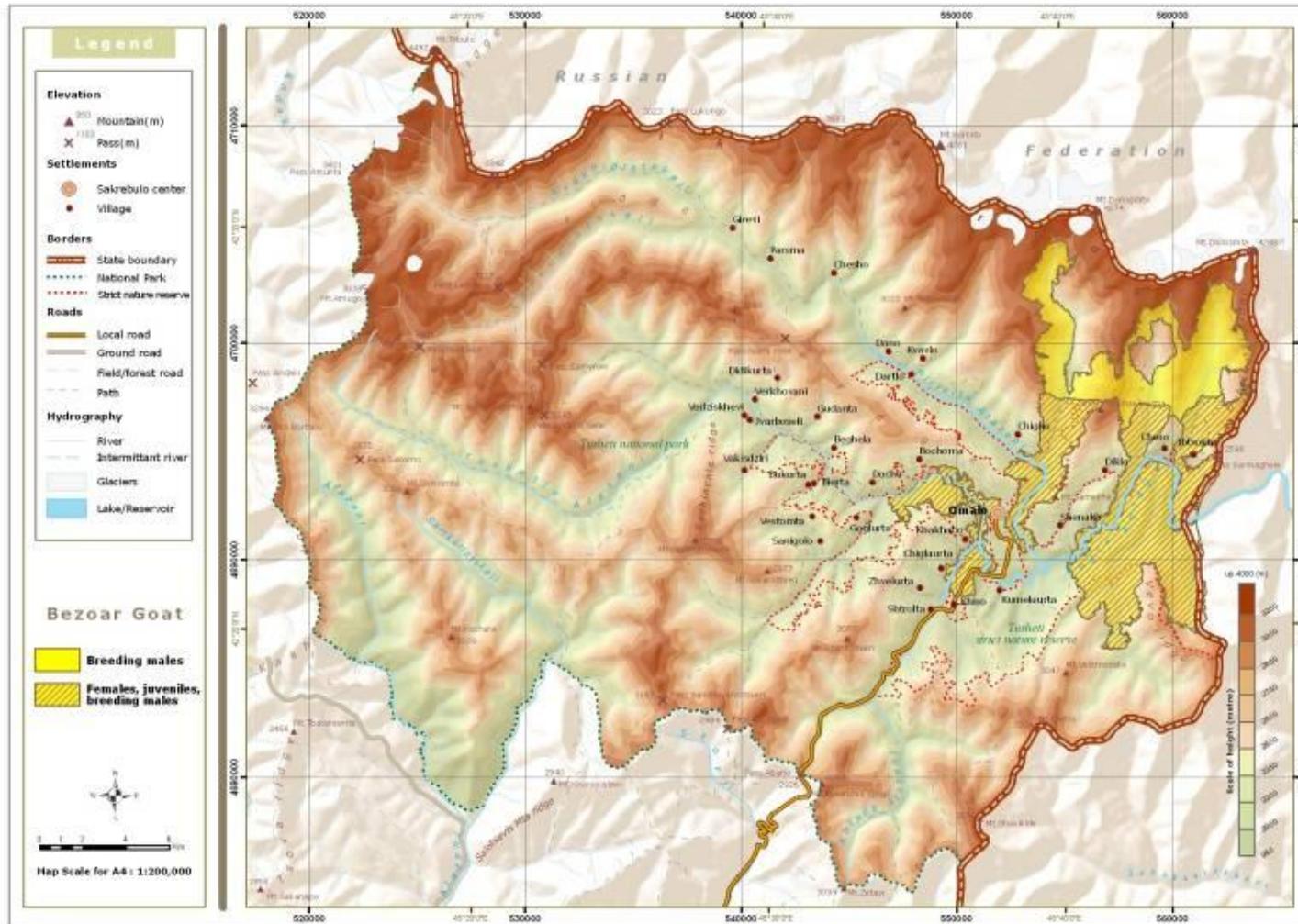


Caucasian Apollo (Photo: G. Darchiashvili)

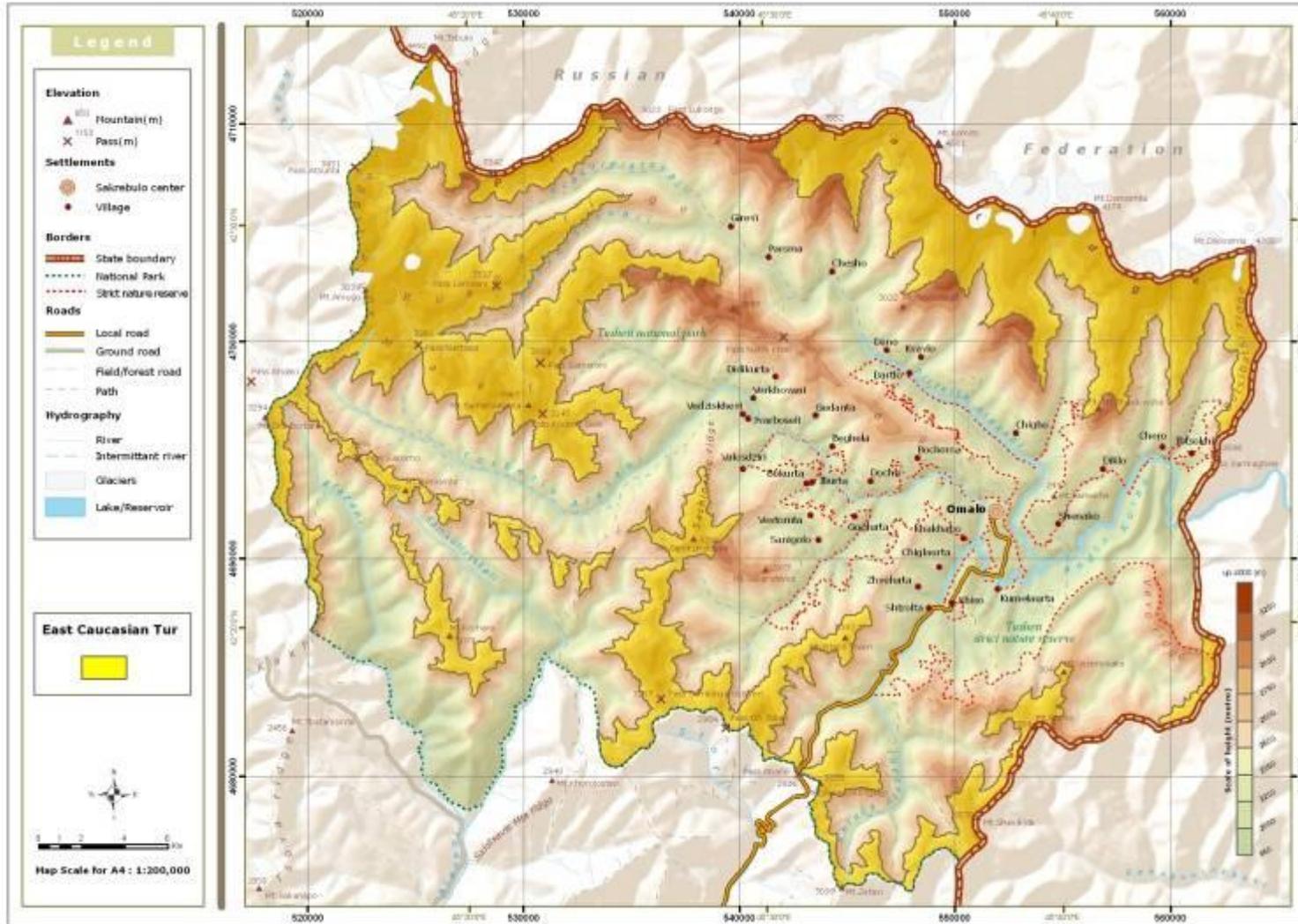
¹⁵ (i) In Kazbegi one may see all the target species except Krü per's Nt hatching (ii) all of these birds are found in a relatively small area so that they can be seen in one day, (iii) the site is close to the capital and is accessible almost year round, (iv) some of the target species may be observed directly from a car, (v) if adequately planned the visitors can be guaranteed to see all the promised birds.

Appendix 1. Maps

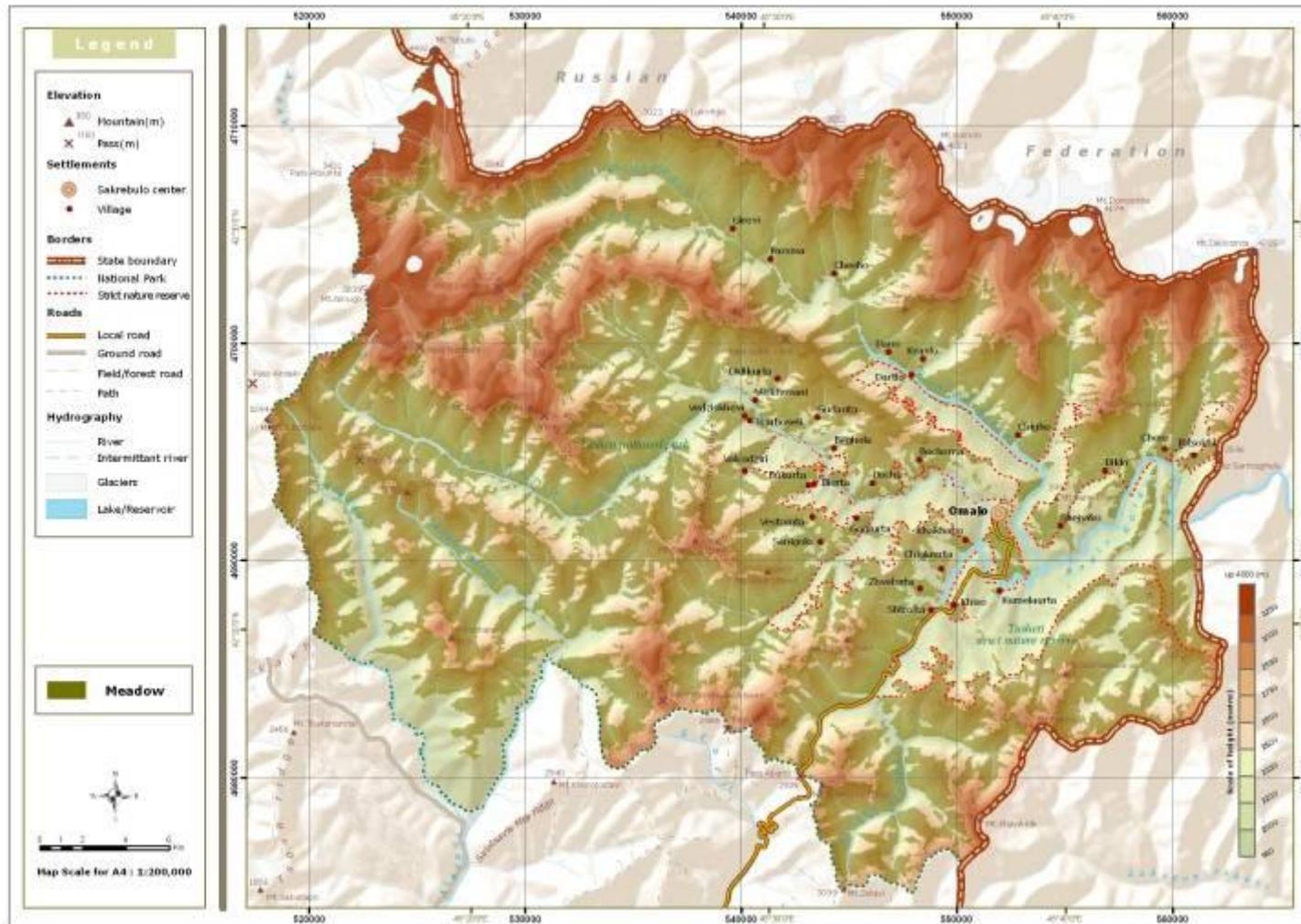
Map 1. Summer Range of Wild Goat (*Capra aegagrus*) in Tusheti



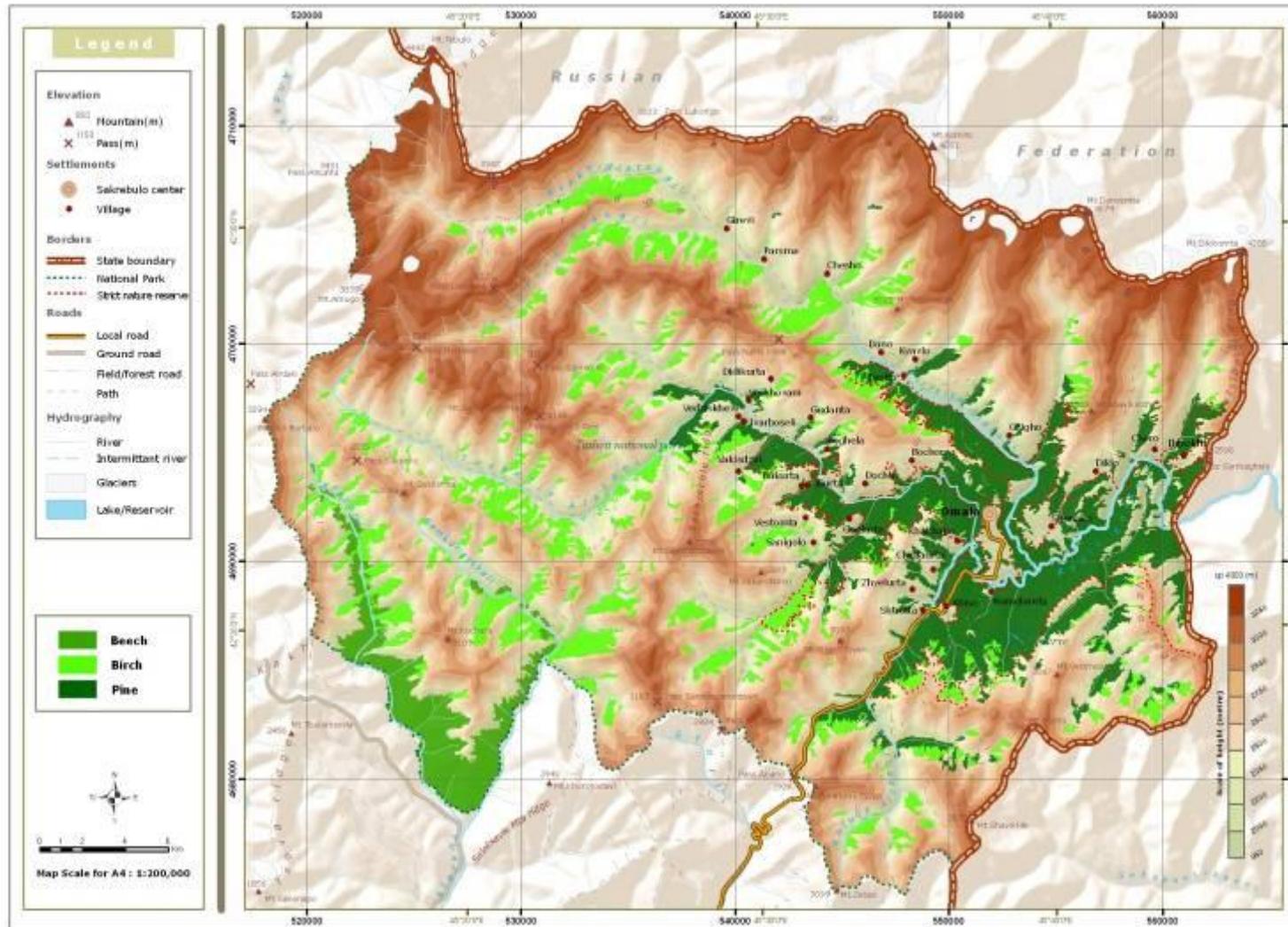
Map 2. Range of Tur (*Capra cylindricornis*) in Tusheti



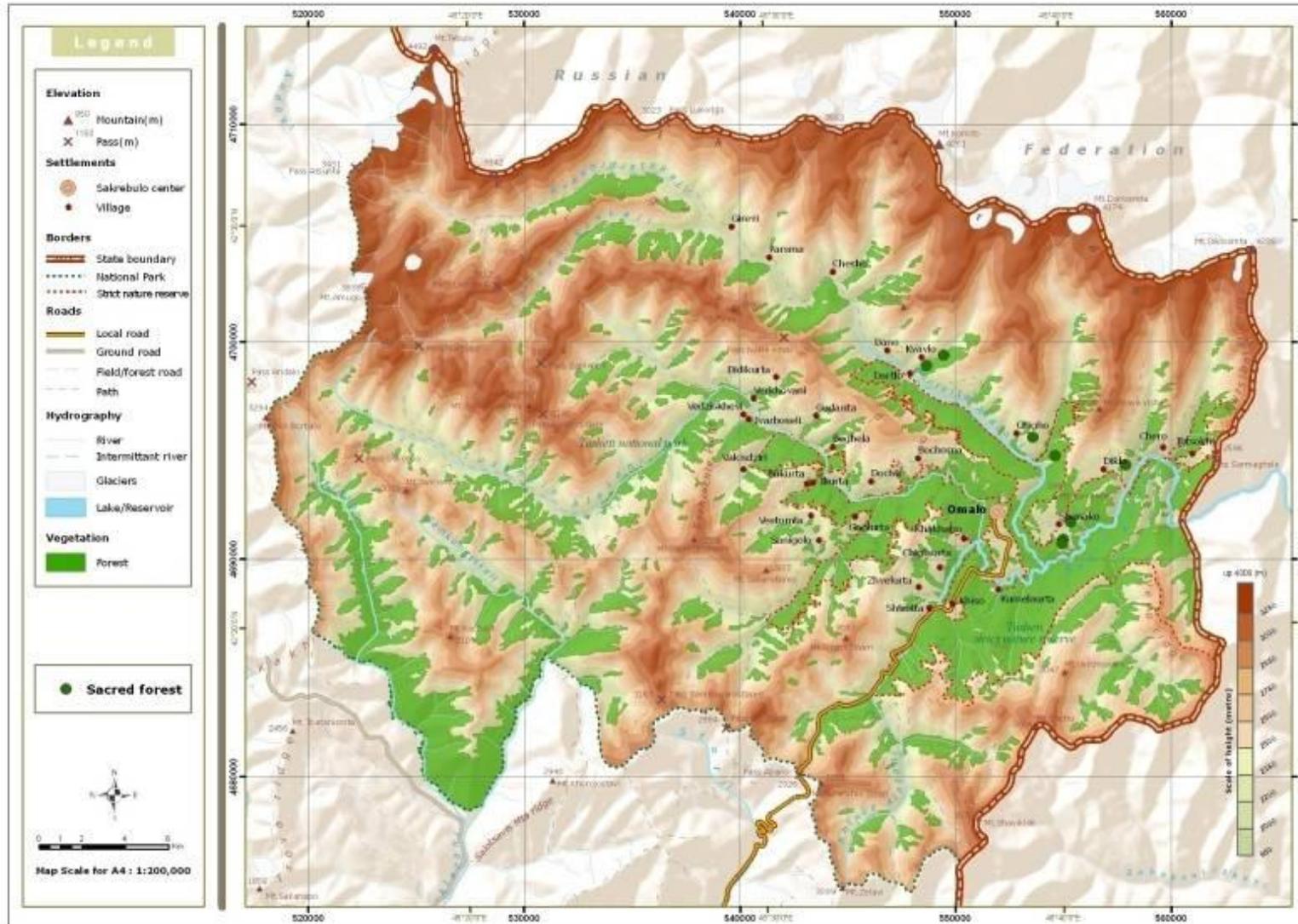
Map 4. Alpine and subalpine meadows



Map 5. Forest habitats in Tusheti



Map 6. Primary map of Sacred forests in Tusheti



Appendix 2. List of bird species recorded in Tusheti

#	Latin name	English name
1.	<i>Accipiter gentilis</i>	Goshawk
2.	<i>Accipiter nisus</i>	Sparrowhawk
3.	<i>Actitis hypoleucos</i>	Common Sandpiper
4.	<i>Aegypius monachus</i>	Eurasian Black Vulture
5.	<i>Aegythos caudatus</i>	Long-tailed Tit
6.	<i>Alectoris chukar</i>	Chukar
7.	<i>Anthus pratensis</i>	Meadow Pipit
8.	<i>Anthus spinoletta</i>	Water Pipit
9.	<i>Apus apus</i>	Swift
10.	<i>Aquila chrysaetos</i>	Golden Eagle
11.	<i>Aquila nipalensis</i>	Steppe Eagle
12.	<i>Ardea cinerea</i>	Grey Heron
13.	<i>Bubo bubo</i>	Eagle Owl
14.	<i>Buteo buteo</i>	Buzzard
15.	<i>Caprimulgus europaeus</i>	Nightjar
16.	<i>Carduelis cannabina</i>	Linnet
17.	<i>Carduelis carduelis</i>	Goldfinch
18.	<i>Carduelis chloris</i>	Greenfinch
19.	<i>Carduelis flavirostris</i>	Twite
20.	<i>Carduelis spinus</i>	Siskin
21.	<i>Carpodacus erythrinus</i>	Common Rosefinch
22.	<i>Carpodacus rubicilla</i>	Great Rosefinch
23.	<i>Certhia familiaris</i>	Common Treecreeper
24.	<i>Cinclus cinclus</i>	Dipper
25.	<i>Coccothraustes coccothraustes</i>	Hawfinch
26.	<i>Columba palumbus</i>	Wood Pigeon
27.	<i>Coracias garrulus</i>	Roller
28.	<i>Corvus corax</i>	Raven
29.	<i>Corvus corone</i>	Hooded Crow
30.	<i>Corvus frugilegos</i>	Rook
31.	<i>Coturnix coturnix</i>	Quail
32.	<i>Cuculus canorus</i>	Cuckoo
33.	<i>Delichon urbica</i>	House martin
34.	<i>Dendrocopus major</i>	Great Spotted Woodpecker
35.	<i>Emberiza cia</i>	Rock Bunting
36.	<i>Emberiza hortulana</i>	Ortolan Bunting
37.	<i>Erithacus rubecula</i>	Robin
38.	<i>Falco peregrinus</i>	Peregrine Falcon
39.	<i>Falco subbuteo</i>	Hobby

40.	<i>Falco tinnunculus</i>	Kestrel
41.	<i>Fringilla coelebs</i>	Chaffinch
42.	<i>Garrulus glandarius</i>	Jay
43.	<i>Gypaetus barbatus</i>	Bearded vulture
44.	<i>Gyps fulvus</i>	Griffon Vulture
45.	<i>Hieraaetus pennatus</i>	Booted Eagle
46.	<i>Hirundo rustica</i>	Barn Swallow
47.	<i>Lanius collurio</i>	Red-backed Shrike
48.	<i>Lanius minor</i>	Lesser Grey Shrike
49.	<i>Loxia curvirostra</i>	Common Crossbill
50.	<i>Merops apiaster</i>	Bee-eater
51.	<i>Milvus migrans</i>	Black Kite
52.	<i>Motacilla alba</i>	White Wagtail
53.	<i>Motacilla cinerea</i>	Grey Wagtail
54.	<i>Muscicapa striata</i>	Spotted flycatcher
55.	<i>Oenanthe oenanthe</i>	Wheatear
56.	<i>Oriolus oriolus</i>	Golden Oriole
57.	<i>Parus ater</i>	Coal Tit
58.	<i>Parus caeruleus</i>	Blue Tit
59.	<i>Parus major</i>	Great Tit
60.	<i>Perdix perdix</i>	Grey partridge
61.	<i>Pernis apivorus</i>	Honey Buzzard
62.	<i>Phoenicurus ochruros</i>	Black Redstart
63.	<i>Phylloscopus lorenzii</i>	Caucasian Chiffchaff
64.	<i>Phylloscopus nitidus</i>	Green Warbler
65.	<i>Phylloscopus trochilus</i>	Willow Warbler
66.	<i>Picus viridis</i>	Green Woodpecker
67.	<i>Prunella modularis</i>	Dunnock
68.	<i>Ptyonogrogne rupestris</i>	Crag Martin
69.	<i>Pyrrhocorax graculus</i>	Alpine Chough
70.	<i>Pyrrhocorax pyrrhocorax</i>	Chough
71.	<i>Pyrrhula pyrrhula</i>	Bullfinch
72.	<i>Regulus regulus</i>	Goldcrest
73.	<i>Saxicola rubetra</i>	Whinchat
74.	<i>Serinus pusillus</i>	Red-fronted Serin
75.	<i>Streptopelia turtur</i>	Turtle Dove
76.	<i>Strix aluco</i>	Tawny Owl
77.	<i>Sylvia communis</i>	Whitethroat
78.	<i>Sylvia curruca</i>	Lesser Whitethroat
79.	<i>Tetrao mlokosiewiczi</i>	Caucasian Black Grouse
80.	<i>Tetraogallus caucasicus</i>	Caucasian Snowcock
81.	<i>Tringa ochropus</i>	Green Sandpiper
82.	<i>Troglodytes troglodytes</i>	Wren
83.	<i>Turdus merula</i>	Blackbird

- | | | |
|-----|---------------------------|---------------|
| 84. | <i>Turdus torquatus</i> | Ring Ouzel |
| 85. | <i>Turdus viscivorus</i> | Mistle Thrush |
| 86. | <i>Tychodroma muraria</i> | Walcreeper |
| 87. | <i>Upupa epops</i> | Hoopoe |
| 88. | <i>Vanellus vanellus</i> | Lapwing |

Appendix 3. Selected camera trapping photos, Tusheti, June - October 2010



Appendix 4. Bibliography

Literature in Georgian:

Guidelines for Monitoring Biodiversity in the Protected Areas of Eastern Georgia, Georgia Protected Areas Development Project, NACRES, 2007. (in Georgian)

Red Data Book of Georgia, "Sabchota Sakartvelo", 1982. (in Georgian)

Tur status report and Conservation Action Plan, NACRES, 2006 (in Georgian)

Literature and report in English:

Report on Baseline Biodiversity Studies, Georgia Protected Areas Development Project, NACRES, 2004.

Management Plan for Tusheti National Park and Tusheti Nature Reserve, 2006.

Akhmedov E.G., Yarovenko Y.A., Nasrullaev N.I., Babaev E.A., Akhmedov S.G. 2009. Conservation of the Bezoar goat in the eastern Caucasus. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Diker H., Diker E., Özalp M., Avcıoğlu B., Kalem S. 2009. The Status of Bezoar Goat (*Capra aegagrus*) in the Kaçkar Mountains, Turkey. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Edge, W. D; Edge, L. O. 1990. Population characteristics and group composition of *Capra aegagrus* in Khirthar national park, Pakistan. Tbilisi: CEPF, WWF.

Guliev, S. M; Weinberg P. J.; Askerov, E. 2009. Daghestan tur (*Capra cylindricornis* Blyth) conservation strategy in Azerbaijan. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Gundogdu, E; Ogurlu, I. 2009. The distribution of wild goat (*Capra aegagrus*) and population characteristics in isparta, Turkey. Journal of animal and veterinary advances.

Khorozyan I. G., Weinberg P. I., Malkhasyan A. G. 2009. Conservation Strategy for Armenian Mouflon (*Ovis [orientalis] gmelini* Blyth) and Bezoar Goat (*Capra aegagrus* Erxleben) in Armenia. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Kopaliani, N; Gurielidze, Z. 2009. Status of turs in Georgia and conservation action plan. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Magomedov M.-R. D., Yarovenko Yu. A. 2009. Current Status of Daghestan Tur (*Capra cylindricornis*) in the Eastern Caucasus (Daghestan). Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Schaller, G. B. and Laurie, A. 1974. Courtship behavior of the wild goat. Zeitschrift für Säugetierkunde.

Talibov T. H., Weinberg P. I., Mammadov I. B., Mammadov E. N., Talibov S. T. 2009, Conservation Strategy of the Asiatic Mouflon (*Ovis [orientalis] gmelini* Blyth) and the Bezoar Goat (*Capra aegagrus* Erxleben) in Azerbaijan. Status and Protection of Globally Threatened Species in the Caucasus. Tbilisi: CEPF, WWF.

Literature in Russian:

Арабули, А. Б. 2006. О распространении леопарда (*Pantera pardus ciscaucasica*) на южном Кавказе, в пределах Грузии. Зоологический журнал, том 85.

Ахмедов, Э. Г. 1999. Структура популяции безоарового козла в оптимальных местообитаниях. Сборник трудов Экология и охрана горных видов млекопитающих.

Бахтиев, А. М. 1989. Безоаровый или бородатый козел в горной чечено-ингушетии (экологический анализ географического распространения). Фауна, экология и охрана животного мира Северного Кавказа.

Бородин, А. М. 1984. Красная Книга СССР. Лесная промышленность, Москва.

Вейнберг, П. И. 1999. О состоянии популяции и особенностях биологии безоарового козла (*Capra aegagrus erxleben*) в Дагестане. Бюл. моск. О-ва испытателей природы. Отд. Биол. Т. 104.

Гаспарян, К. М. 1964. К кормовому режиму безоаровых коз *Capra aegagrus erxleben* на урцском (сарабулагском) хребте. Академия наук Армянской ССР. XVII Зоологически сборник.

Гаспарян, К. М. 1974. Экология безоарового козла. Академия наук Армянской ССР. XVI Зоологически сборник.

Даль, С. К. 1951. Данные по биологии, распространению, численности и количественному соотношению в стадах безоаровых коз на урцском хребте. Известия IV, # 1-3, Академия наук Армянской ССР.