Forest, Parks and Wildlife Department
Government of Gilgit-Baltistan

HIMALAYAN IBEX & BLUE SHEEP

IN GILGIT-BALTISTAN

RUT SEASON SURVEY REPORT 2023-24

PARKS & WILDLIFE
FOREST DEPARTMENT
SNOW LEOPARD FOUNDATION
IUCN

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HIMALAYAN IBEX *(Capra sibirica)* & BLUE SHEEP *(Pseudois nayaur)*

IN GILGIT-BALTISTAN, PAKISTAN

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REPORT SUMMARY


Plate 1: Snow leopard apex predator of ibex and blue sheep.

Gilgit-Baltistan (GB) has now become a global success story of wildlife conservation when managed by the community. The population of some of the world's rarest wildlife, such as the markhor (Capra falconeri), blue sheep (Pseudois nayaur), Himalayan ibex (Capra sibirica), Marco Polo sheep (Ovis ammon polii), Ladakh urial (Ovis vignei vignei), Kashmir musk deer (Moschus cupreus), snow leopard (Panthera uncia), brown bear (Ursus arctos), and Asiatic black bear (Ursus thibetanus), was declining when there was minimal community involvement in wildlife conservation. When the community was recognized as custodians of wildlife only in 1990 by initiating trophy hunting program. This program not only instilled diligence in communities for wildlife conservation but also aided in the recovery of dwindling wildlife populations. Currently, trophy hunting earns millions of Pakistani rupees each year, helping uplift the socioeconomic status of communities. The effectiveness of this program cannot solely be measured by the income it generates; rather, it should be assessed based on its impact on the population trends of wild ungulates.


Plate 2: Blue sheep in its habitat.

The status of wildlife species in Pakistan is typically based on anecdotal data. Similarly, the population of wild ungulates has been reported using different methods that were not statistically robust enough to estimate populations, resulting in biased estimates that often lack expected demographic data reported globally using statistically robust methods. For the past two years, statistically robust methods like the double observer survey method have been applied to assess the population trends of wild ungulates in GB.

Using double observer survey method one Community-Controlled Hunting Areas (CCHAs) were surveyed for blue sheep 23rd November – 30th November 2023 while 57 CCHAs were surveyed from December 15, 2023 – February 15, 2024, for Himalayan ibex. During the survey we counted an overall population of blue sheep as 1,322 and Himalayan ibex 5,511 individuals.

Using Bayesian statistics in BBRecapture package of R, the estimated population of blue sheep was 1,322, while the estimated population might be 804 – 1,862 at 95% confidence interval). The demography of the blue sheep herds was 491 females, 191 young, 117 yearlings, 54 class I, 53 class II, 60 class III, 354 class IV males, while 210 among class IV were trophy size the male to female ratio was 1.06:1.


Plate 3: Himalayan ibex male and female prior to rut season.

Likewise, the estimated population of Himalayan ibex was 5,584 individuals and the estimated population of ibex at 95% confidence interval might be 4,618 – 6,649 individuals. The ibex was sighted in 229 herds with an average herd size of 24 animals. Among sighted animals 2,080 were females, 743 were young, 677 were yearling, while 471, 427, 372 and 692 were class I, II, III and IV males respectively. Among IV males there were 416 trophy size males the female to male ratio was 0.93:1.

Using the two-set trophy rules, if 2% of the animals are harvested from the total population, i.e., (1,322) 26 blue sheep and (5,511) 110 ibex can be harvested. If 25% of trophy-sized animals are opted for harvesting, then 52 out of 210 total trophies of blue sheep and 104 out of 416 ibex can be harvested.

1. INTRODUCTION

Gilgit-Baltistan (GB), the northernmost entity in Pakistan, has had only attractions owing to its landscape previously, such as the world's largest mountain ranges, the Himalayas, Hindu Kush, and Karakoram-Pamir, many highest peaks including the world's second-highest peak K2 and many glaciers that make longest length and mass of glaciers outside of the North Pole.


Plate 4: Grey wolf a controversial predator in the Himalaya-Karakoram mountain ranges.

Now, Gilgit-Baltistan has other attractions to offer than its mountainous landscape like the world's rarest wildlife species, such as the snow leopard (Panthera uncia), brown bear (Ursus arctos isabellinus), Asiatic black bear (Ursus thibetanus), and grey wolf (Canus lupus), roam. These carnivore species feed on some of the most coveted trophies, such as the Astor markhor (Capra falconeri falconeri), Himalayan ibex (Capra sibirica), blue sheep (Pseudois nayaur), Ladakh urial (Ovis vignei vignei), and Marco Polo sheep (Ovis ammon polli) (Ali et al., 2021) owning to successful trophy hunting program in GB, not only has the population of wild ungulates increased, but the number of carnivores has also increased, and the number of ungulates offered as trophy animals is increasing (Ahmad et al., 2022; Haider et al., 2021; Khattak et al., 2019).

The trophy hunting program is a mutually beneficial agreement in which custodian communities pledge to protect wildlife and, in return, receive 80% of the proceeds from legal hunts, which they use for social development in their valley. There are many successful stories of how these proceeds have been used for education and health development (Shackleton, 2001). The program has also helped to recover the population of the once widely distributed Himalayan ibex and blue sheep from the brink of extinction.

1.1 Blue Sheep

Blue sheep (Pseudois nayyaur), also known as bharal, is an intermediate between a goat and sheep, the morphology of the blue sheep looks like a sheep, but its behavior and habitat requirements are more like a goat (Schaller, 1977). It is found in the high-altitude regions of the Himalayas in China, India, Nepal, Pakistan, and Bhutan (Figure 1 A). In Pakistan, it is endemic to the northernmost parts of the district of Hunza in Gilgit-Baltistan (Figure 1 B).


Plate 5: Herd of blue sheep in its habitat.

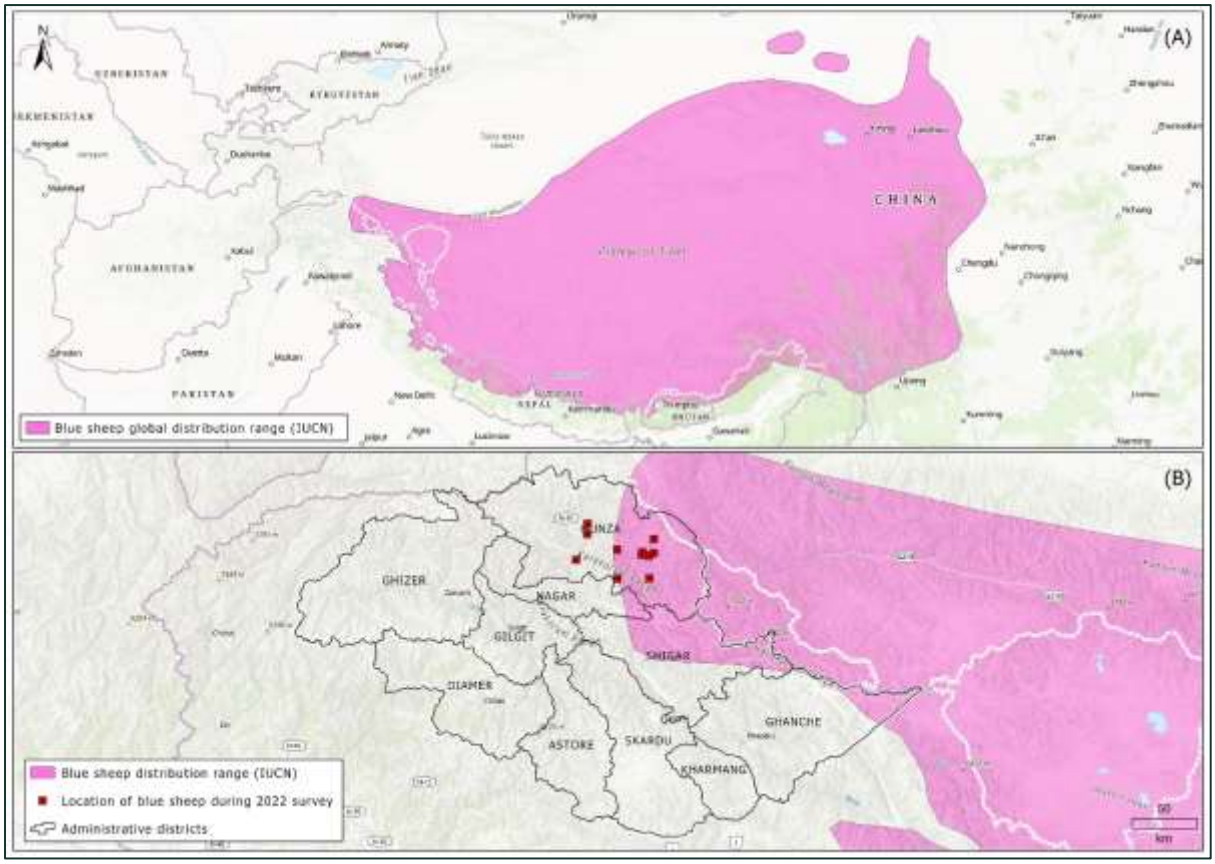

Figure 1: (A) global distribution (B) distribution of blue sheep in Gilgit-Baltistan.

Blue sheep live on rugged terrain with rocky slopes at elevations between 3,000 and 5,500 meters. Blue sheep have a thick, woolly coat that can range in color from gray blue to reddish-brown which makes them adoptable for harsh climate. To account for predation risk, they live in herds of up to 100 individuals. They are herbivores and feed on a variety of grasses, herbs, and shrubs (Schaller, 1977). Blue sheep is a dimorphic animal, with males having larger horns and body size than females. Males may weigh up to 75 kg, while females may weigh up to 45 kg (Schaller, 1977) (Figure 2). The blue sheep is listed as "Least Concern" on the IUCN Red List (Harris, 2014), while in Pakistan it is listed as "Endangered" (Sheikh and Molur, 2004).

Figure 2: Demographic categories of Pseudois nayyaur adopted from (Castelló, 2016).

1.2 Himalayan ibex

The Himalayan ibex, also known as the Asiatic or Siberian ibex, occurs in the mountain ranges starting from the Eastern Siyan to the Himalayas, making it a widespread presence in the northern ranges of many countries including Afghanistan, China, India, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan, and Uzbekistan (Figure 3 A). In Pakistan, it is the most numerous species of genus Capra and mostly occurs in the northern parts of the country on the mountain ranges of the Himalayas, Karakoram, Pamir, and Hindu Kush in the provinces of Gilgit-Baltistan, Khyber Pakhtunkhwa (KPK), and in the state of Azad Jammu and Kashmir (AJ&K) (Figure 3 B). Despite its wide range distribution, the population of ibex is in decline globally and it has recently been up listed from "Least Concern" to "Near Threatened" on the IUCN (International Union for Conservation of Nature) red list (Reading et al., 2020), while in Pakistan the ibex has been listed as "Least Concern" (Sheikh & Molur, 2004).

Plate 6: Herd of Himalayan ibex in its habitat.

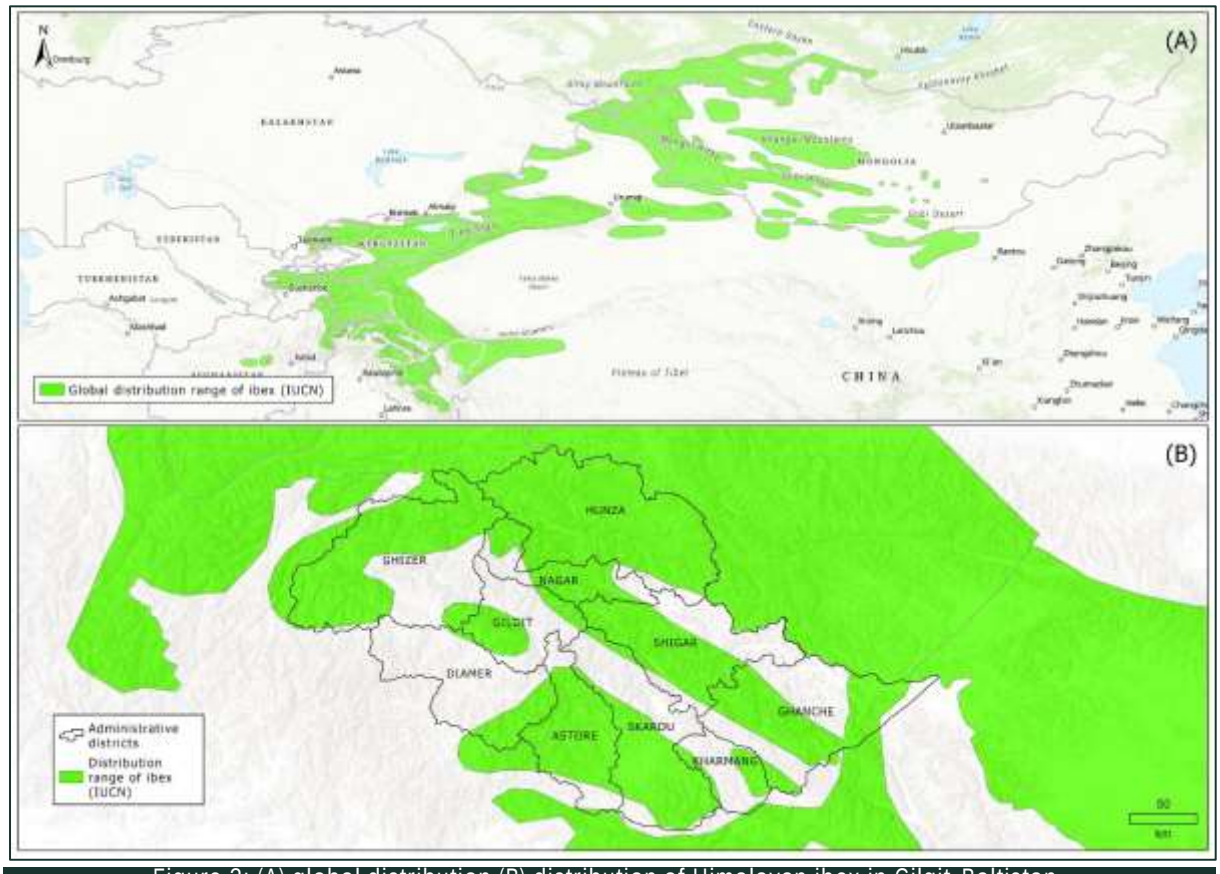

Figure 3: (A) global distribution (B) distribution of Himalayan ibex in Gilgit-Baltistan.

The Himalayan ibex is a highly dimorphic animal with males of the species being heavily built within the genus Capra, having large elegant backward horns, and with an adult male's body

weight reaching up to 130 kg (about 286.6 lb.) and that of females up to 60 kg (Schaller, 1977) (Figure 4).

Figure 4: Demographic categories of Capra sibirica adopted from (Castelló, 2016).

1.3 Objectives of Study

Each year the Parks and Wildlife Department, Gilgit-Baltistan offers a sizeable number of Himalayan ibex and blue sheep as trophies. As the 80% of trophy fees goes to communities therefore, to ensure that trophy quota is allocate based on statistically robust data and to check the effectiveness of conservation on communities (Singh & Milner-Gulland, 2011). It is imperative to conduct population monitoring surveys each year. Therefore, this survey was undertaken with the following objectives.

1. To assess the distribution and population dynamics of blue sheep and Himalayan ibex in Gilgit-Baltistan.
2. To document trophy-sized animals in different community-controlled hunting areas and formulate recommendations for trophy quotas for the upcoming period of 2024-2025.
3. To utilize Bayesian statistical methods to predict the estimated population of blue sheep and Himalayan ibex in Gilgit-Baltistan.
4. To assess the yearly population trend of blue sheep and Himalayan ibex in Gilgit-Baltistan.
5. To identify any issues and suggest recommendations to address them.

2. MATERIALS AND METHODS

2.1 Study Area

The survey for blue sheep was conducted from 23rd November 2023 to 30th November 2023 in Shimshal, a Community Controlled Hunting Areas (CCHA) of district Hunza. While for Himalayan ibex surveys were conducted in 58 CCHAs of Gilgit-Baltistan from 15th December 2023 – 15th February 2024. (Figure 5).

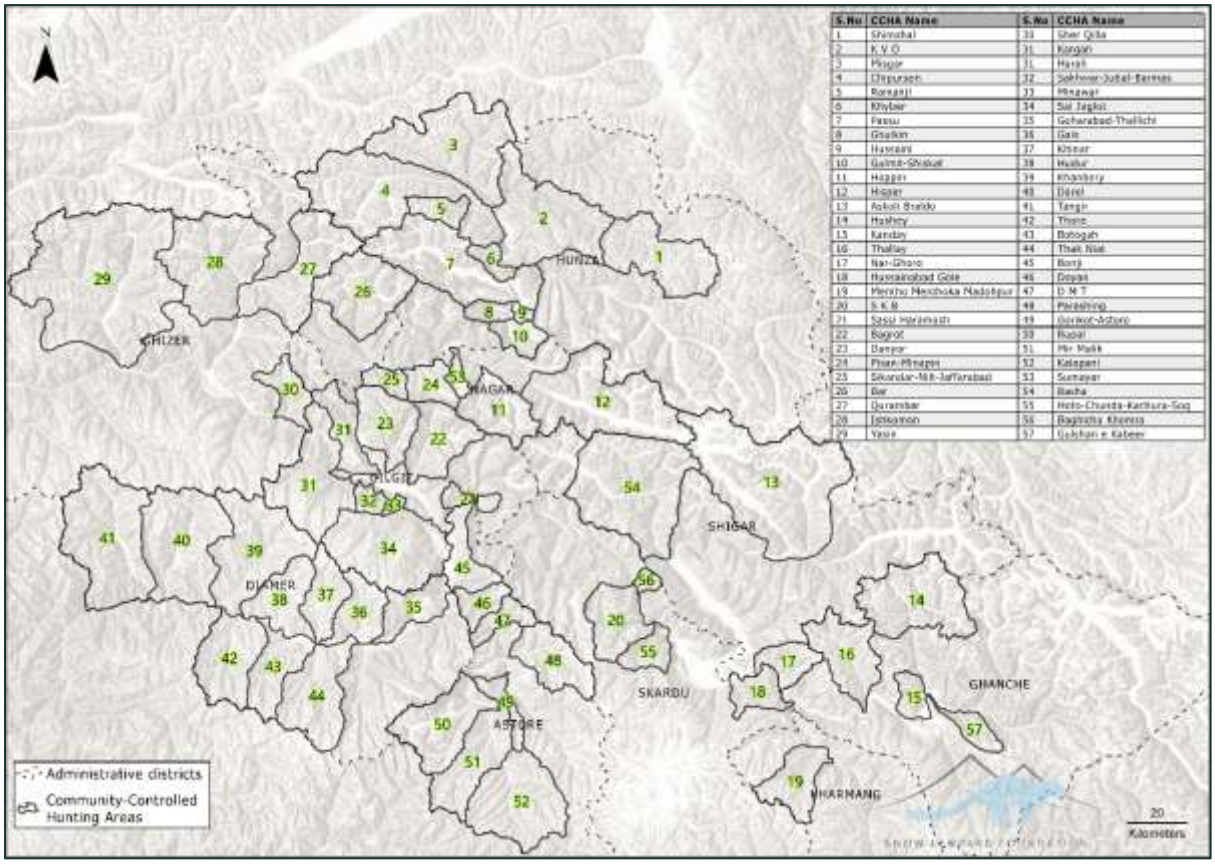

Figure 5: Community Controlled Hunting Areas surveyed wild ungulates.

2.2 Double Observer Method

The double observer method (DOM) was used, which is based on the principles of mark-recapture. The method was originally developed to estimate the detection probabilities of aerial surveys for various wildlife species (Caughley, 1977), the DOM equation was modified by Magnusson et al. (1978) to account for observer differences in detecting the target species. Forsyth and Hickling (1997) applied the DOM to ground surveys for the first time, to estimate Himalayan Thar in New Zealand.

The method involves two observers who scan and count animals, either separated by space or time in survey blocks not larger than the daily movement range of humans or animals. The blocks are defined by physical features, such as high ridges and rivers, that may prevent animals from moving between blocks.

2.3 Data Collection in the Field

The survey maps were developed by dividing each CCHA (Community Controlled Hunting Areas) into small blocks of area (25 – 40 km2) using ArcGIS Pro 3.2.2 (ESRI, Redland, California USA).

2.4 Scanning for Animals

Mountain ungulates are crepuscular (Roberts, 1997; Schaller, 1977, 1980), so scans were conducted at dawn and dusk. Spotting scopes (Swarovski 30 x 70) and binoculars (Nikon 10x50) aided the scanning effort. Whenever a herd was sighted, the necessary information (size, type, demography, location, elevation etc) was recorded on a field data collection sheet. Geographical Positioning System (GPS) device, such as Garmin 64S, 66S, or 66ST, was used to record the observer's location, and the location of herd was delineated on the map.

Plate 7: Survey team ready for starting the survey.

2.5 Demographic Classification

The "Capture Recapture" method can only be accurately applied to wild ungulates if they are dimorphic and can be identified based on age classes (Suryawanshi et al., 2012). By using the demographic classification suggested by Schaller (1977) shown in Table 1, the herds were identified. The composition of the herds, such as female herds (females and young), male herds (only males), and mixed herds (males, females, and young), was recorded to aid in identifying repeated captures and single captures. The number of trophy-sized animals within class IV was separately recorded.

Table 1: Demographic classification proposed by Schaller (1977) for mountain ungulates.

Female Classification	Kids Classification		Males Classification				
Female > 2	Young < 1	Yearling 1 < 2	Class I ($2^{1/2}$) years	Class II ($3^{1/2}$) Years	Class III ($4^{1/2}$) Years	Class IV ($5^{1/2}$) Years	Trophy Size Within Class IV

2.6 Habitat Features of Herds Location

To distinguish the herds sighted by both observers, the habitat features, such as snow, bare rock, glacier, rangeland, shrubs, mixed forest, and slope (North, South, East, and West), were recorded. The behavior of the herd at the time of sighting, such as feeding, walking, running, or resting, was also noted to ensure that the animals had given the observer a chance to count them well.

2.7 Post Survey Discussion

Both observers cross-checked field records in the evening, noting repeated and single groups based on herd size, composition, habitat type, location, and behavior. The data was then compiled in summary sheets for later population estimation analysis.

2.8 Data Analysis Approach

The total number of Astore markhor and Ladakh urial groups was estimated using the two-survey mark-recapture in the "BBRecapture" package that uses the Bayesian framework in R statistical and programming environment (Fegatelli & Tardella, 2013) version 4.2.2, R Core Team, 2022.

We analyzed group size following (Ahmad et al., 2022; Khanyari et al., 2021; Suryawanshi et al., 2012). We used age-sex composition and location of sightings to determine if the groups were seen by one or both teams. Groups seen by both teams were coded as "11", groups seen only by the first observer as "10", and groups seen only by the second team as "01".

We modeled the detection of the two teams separately ("mt" model). To estimate the number of ibex and blue sheep groups ($\hat{G}$) in our study areas, we used the "BBRecap" function with a "uniform prior" for each species. The "mt" model was chosen because detection probability was expected to differ between the two surveys (Suryawanshi et al. 2012). The model was run for 10,000 mcmc iterations with a 1000 burn-in (Fegatelli & Tardella, 2013).

The model "mt" estimated detection probabilities for observer teams one and two for occasions one and two. We calculated the total population (Nest) of each ungulate species by

multiplying the estimated number of groups ($\hat{G}$) and the estimated mean group size (μ). To estimate the confidence intervals for the population, we created a distribution of estimated group size by resampling it 10,000 times with replacement. Then, we generated a distribution of estimated population by multiplying 10,000 random draws of estimated number of groups ($\hat{G}$) weighted by posterior probability and draws of mean group size (μ). The median of the resulting distribution was taken as the estimated ungulate population (Nest) with the 2.5 and 97.5 percentiles as the confidence intervals.

To determine the 95% confidence intervals of the proportion of individuals from different age-sex classes (adult male, adult female, and young), we performed 10,000 bootstraps using the herd as the sampling unit. The median values were taken as the estimates, and the 0.025 and 0.975 quartiles served as the 95% confidence intervals.

To calculate densities, we divided the estimated abundance by the total area sampled. The total area was obtained by summing the areas of all surveyed blocks, which were demarcated as the visible areas in each block using ArcGIS Pro version 3.2.2 by the survey team after the survey.

3. RESULTS

3.1 Population of Himalayan Ibex and Blue Sheep

Using the double observer survey, we counted an overall 1,322 blue sheep in Shimshal and Sockterabad. The estimated population was 1,322, which might range from 804–1862 at a 95% confidence interval (Table 2). The blue sheep were sighted in 19 herds (Figure 7) with a mean herd size of 69.57 and median herd size of 46 animals, the herd size ranged from 9–269 animals per herd. The highest number of blue sheep was sighted in Shimshal (1,251 animals) followed by Sockterabad i.e., 71 blue sheep individuals. (Table 3 and Figure 6).

Using the double observer survey method, we counted an overall population of 5,511 Himalayan ibex individuals. The estimated population using statistical analysis was 5,584. The Himalayan ibex population in 50 CCHAs might range from 4,618 to 6,649 individuals at a 95% confidence interval. The ibex was sighted in 229 herds (Figure 9), with a mean herd size of 24.38 and a median herd size of 15.5. The herd size ranged from 1 to 435 animals per herd (see Table 2 and Figure 8). The highest population of ibex counted in Hunza district followed by Ghanche and Skardu districts (Table 4 and Figure 8).

Table 2: Summary of statistical analysis of blue sheep and Himalayan ibex population.

Statistics	Blue sheep	Himalayan ibex
Number of Community-Controlled Hunting Areas	2	50
Detection Probability of Observer ONE	0.95	0.98
Detection Probability of Observer TWO	0.95	0.25
Observer ONE total	1,322	5,483
Groups Only Sighted by Observer ONE	0	175
Observer TWO total	1,322	1257
Groups Only Sighted by Observer TWO	0	0
Groups Sighted by Both Observers	19	58
Total groups	19	229
Mean group size	69.57	24.38
Overall population	1,355	5,511
Estimated population	1,355	5,584
Estimated Population at + 95% (CI)	804 – 1,862	4,618 – 6,649
Percentage of male	39.56	35.80
Percentage of trophy males within males	40.15	21.20
Percentage of female	37.14	38.28
Percentage of young	14.44	13.55
Percentage of yearlings	8.85	12.35
Ratio (Male: Female)	1.06:1	0.93:1
Ratio (Female: Young)	1:2.57	1:2.82

Table 3: Population of blue sheep.

Valley	Female	Young	Yearling	Class1	Class2	Class3	Class4	Total	Trophies
Shimshal	461	179	108	46	45	60	352	1251	206
Sockterabad	30	12	09	08	08	00	04	71	04
Total	491	191	117	54	53	60	356	1,322	210

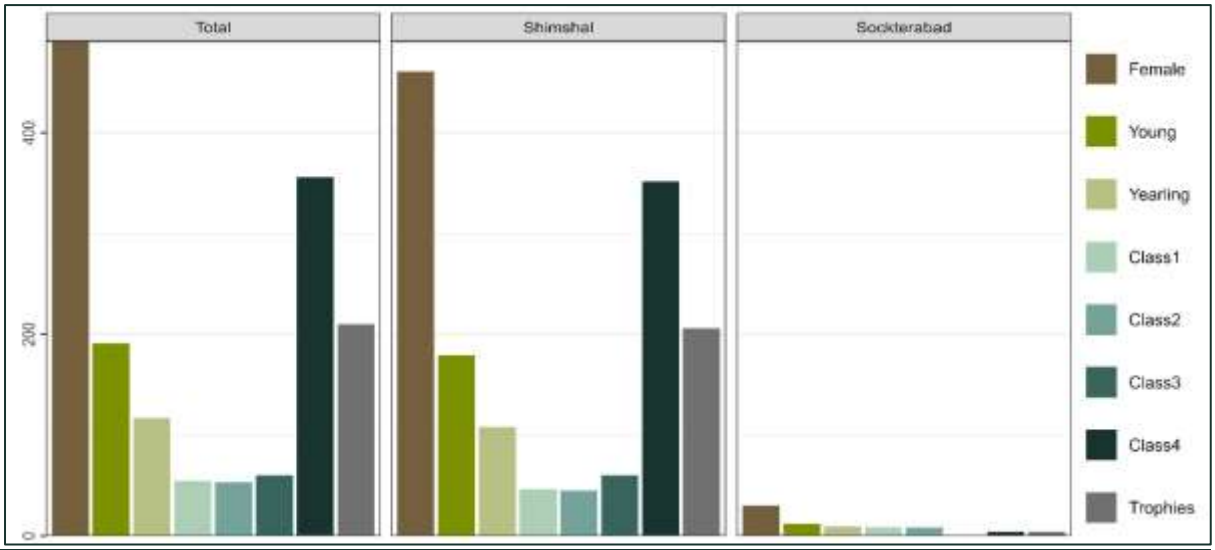

Figure 6: Demographic categories of blue sheep.

Plate 8: Herd of Blue Sheep in Shimshal CCHA.

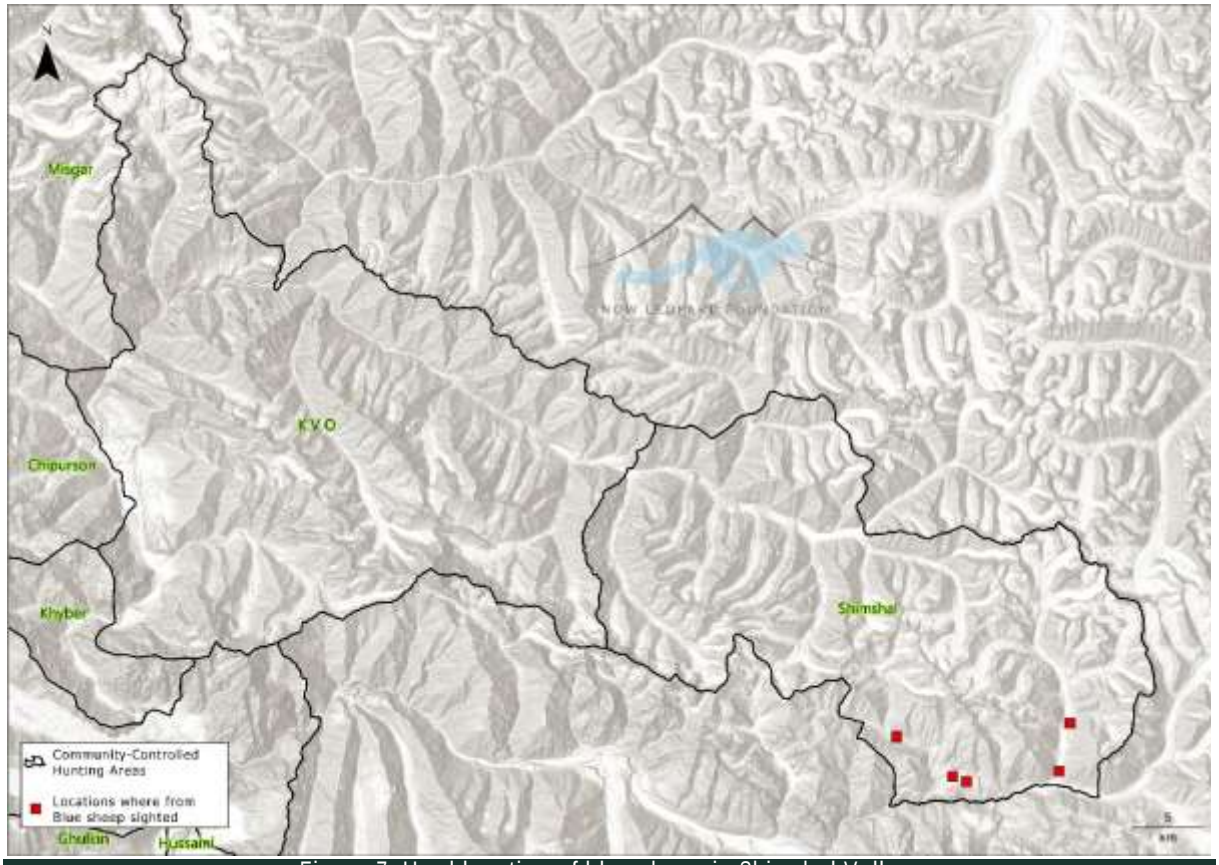

Figure 7: Herd location of blue sheep in Shimshal Valley.

Table 4: Demography of Himalayan ibex recorded during the survey.

District	Valley	Female	Young	Yearling	Class1	Class2	Class3	Class4	Total	Trophies
Hunza	Chipurson	89	12	27	19	23	16	27	213	17
	Raminji	38	14	15	8	4	4	6	89	6
	KVO	121	20	42	11	19	11	25	249	15
	Misgar	196	110	55	69	64	54	142	690	85
	Khyber	157	28	36	13	15	21	30	300	19
	Passu	111	23	35	31	24	25	57	306	19
	Hussaini	106	27	32	18	16	21	37	257	17
	Ghulkin	98	25	30	20	18	18	38	247	24
	Gulmit	90	27	42	17	14	11	19	220	12
	Shimshal	71	43	38	16	12	9	80	269	46
	District Total	1077	329	352	222	209	190	461	2840	260
Ghizer	Qurmber	47	27	3	0	1	14	9	101	9
	Ishkoman	20	16	3	0	1	7	2	49	2
	Shir Qillah	3	2	0	0	5	5	1	16	0
	Yaseen	3	1	0	0	0	0	0	4	0
	District Total	73	46	6	0	7	26	12	170	11
Gilgit	Bagrot	28	7	15	5	7	7	2	71	0
	Danyour	24	14	6	4	3	0	0	51	0
	Sassi Haramosh	15	7	5	2	4	1	1	35	0
	District Total	67	28	26	11	14	8	3	156	0
Astore	Rupal	30	13	12	11	6	8	11	91	6
	Kala Pani	11	5	8	5	4	2	0	35	0
	Gorikot	11	11	1	2	3	8	0	36	0

District	Valley	Female	Young	Yearling	Class1	Class2	Class3	Class4	Total	Trophies
	Mir Malik	8	1	7	1	0	1	2	20	1
	Parashing	9	12	15	1	2	0	0	39	0
	DMT	11	4	6	1	3	2	4	31	2
	District Total	80	46	49	21	18	21	17	252	9
Nagar	Hisper	33	22	18	13	16	20	11	133	11
	Hopper	22	12	6	8	4	5	9	66	6
	Pissan- Minapin	19	5	0	5	6	5	5	45	3
	Sikander Abad	14	0	6	2	4	6	1	33	0
	Sumayar Valley	4	1	1	0	0	0	0	6	0
	Bar Valley	21	24	7	2	4	5	7	70	4
	District Total	113	64	38	30	34	41	33	353	24
Skardu	Basho	44	0	13	17	3	15	9	101	8
	Borgay	7	0	1	1	1	0	2	12	0
	Hoto Chanda Nallah	27	14	9	0	4	0	9	63	0
	Hussain Abad Gole	2	1	1	2	1	0	0	7	0
	Mendi	13	8	0	1	1	2	2	27	0
	Nar Goro	11	2	3	1	2	2	3	24	0
	SKB	51	29	24	18	4	0	33	169	0
	Tormik	28	12	12	7	8	3	7	77	6
	Baghicha and Khomera	24	15	12	20	10	3	11	95	11
	Astak	16	4	4	8	4	4	0	36	0
	District Total	223	85	79	75	38	29	76	611	25
Shigar	Basha	101	30	35	20	16	8	9	219	9
	Asqoli Biafo Dumurdo Laskam	3	10	9	4	4	3	2	61	1
	District Total	104	40	44	24	20	11	11	280	10
Kharmang	Mehdiabad Manthoka-Manthu	5	0	0	0	0	2	2	9	2
	District Total	5	0	0	0	0	2	2	9	2
Ghanche	Hushey	182	50	41	50	45	30	37	435	37
	Kanday Saling	97	21	20	20	25	6	20	209	20
	Thallay	21	16	12	4	1	1	10	65	10
	Gulshan-e-Kabeer	41	8	8	10	12	4	5	88	5
	Kharko	15	10	2	4	4	3	5	43	3
	District Total	356	105	83	88	87	44	77	840	75

Figure 8: Demographic categories of Himalayan ibex.

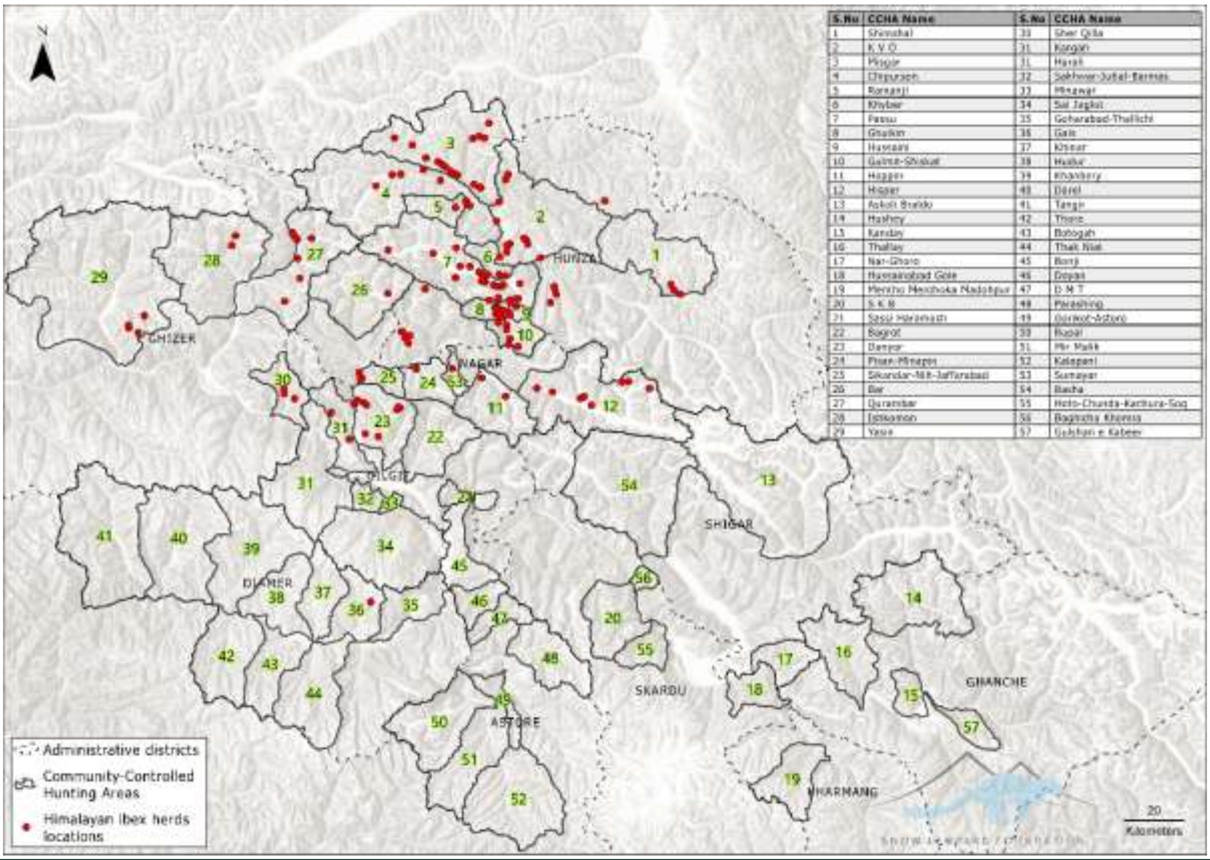

Figure 9:Herds locations of Himalayan ibex in different CCHAs.

Plate 9: A typical habitat of Himalayan ibex.

3.2 Population Density

3.2.1 Population Density of Blue sheep

The highest per square kilometer occupancy of blue sheep was observed in the CCHA of Shimshal Valley i.e., 2.08 (Figure 10).

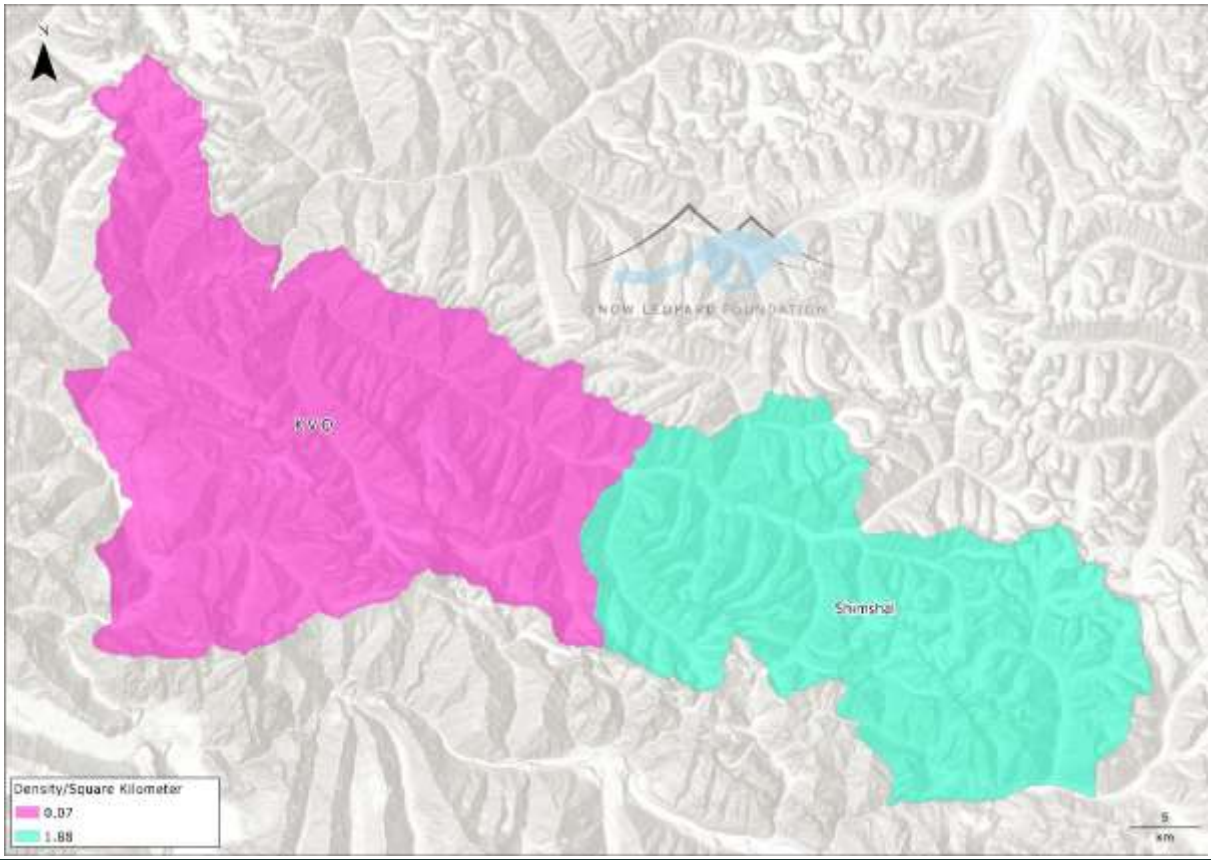

Figure 10: Population density of blue sheep in the Surveyed CCHA.

3.2.2 Population Density of Himalayan Ibex

The density of Himalayan ibex ranged from 0 to 7.88 individuals per square kilometer (km²). The highest density was observed in Hussaini CCHA, followed by Khyber with 2.89, and Ghulkin with 2.48 animals per square kilometer (Figure 11).

S.No	CCHA Name	S.No	CCHA Name	S.No	CCHA Name
1	Shimshal	21	Sassi Haramosh	40	Darel
2	K V O	22	Bagrot	41	Tangir
3	Misgar	23	Danyor	42	Thore
4	Chipurson	24	Pisan-Minapin	43	Botogah
5	Ramanji	25	Sikandar-Nilt-Jaffarabad	44	Thak Niat
6	Khyber	26	Bar	45	Bonji
7	Passu	27	Qurambar	46	Doyan
8	Ghulkin	28	Ishkoman	47	D M T
9	Hussaini	29	Yasin	48	Parashing
10	Gulmit-Shiskat	30	Sher Qilla	49	Gorikot-Astore
11	Hopper	31	Kargah	50	Rupal
12	Hisper	31	Harali	51	Mir Malik
13	Askoli Braldo	32	Sakhwar-Jutial-Barmas	52	Kalapani
14	Hushey	33	Minawar	53	Sumayar
15	Kanday	34	Sai Jaglot	54	Basha
16	Thallay	35	Goharabad-Thallichi	55	Hoto-Chunda-Kachura-Soq
17	Nar-Ghoro	36	Gais	56	Baghicha Khomra
18	Hussainabad Gole	37	Khinar	57	Gulshan e Kabeer
19	Mentho Menthoka Madohpur	38	Hudur		
20	S K B	39	Khanbery		

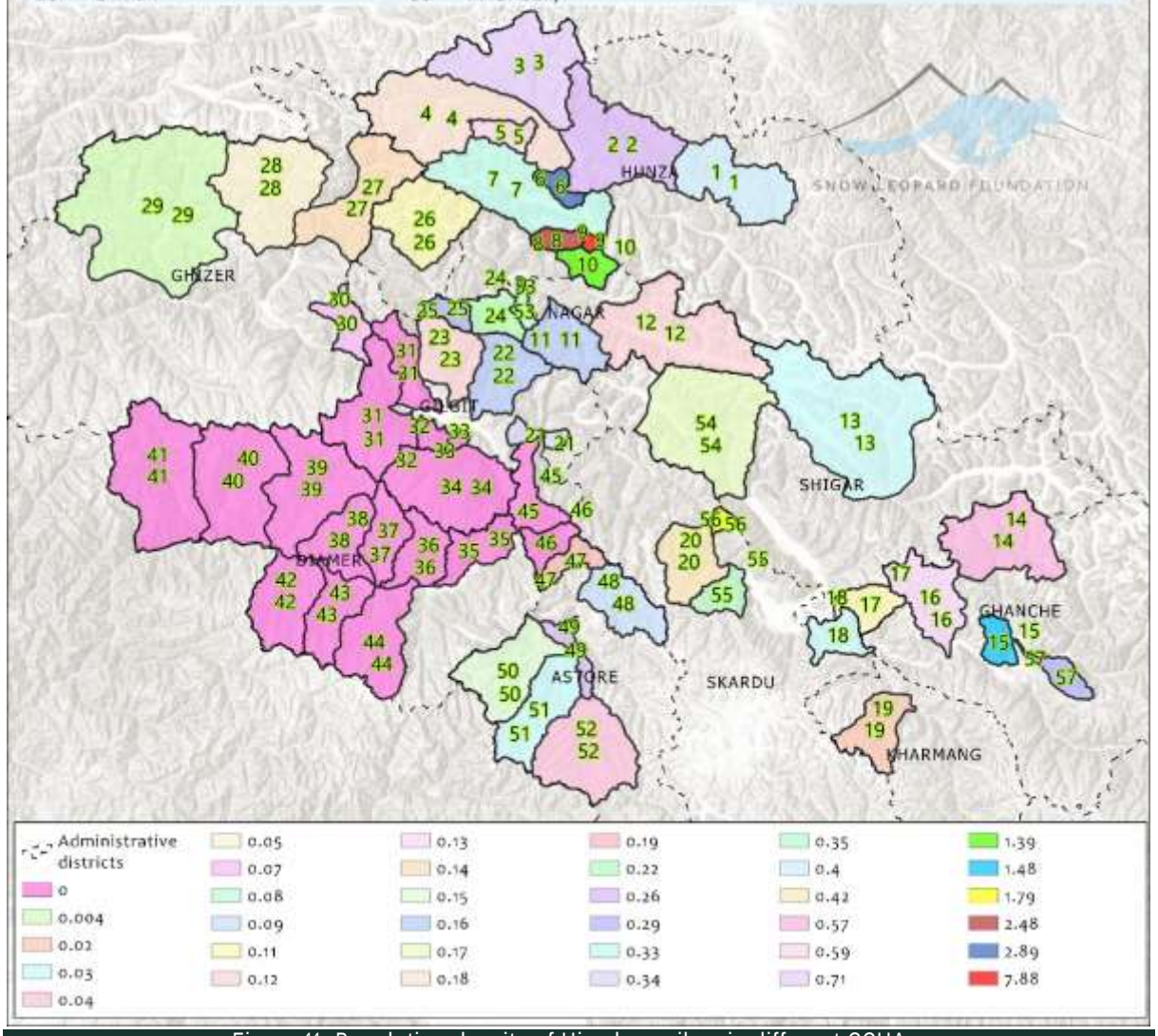

Figure 11: Population density of Himalayan ibex in different CCHAs.

3.3 Population Trend

3.3.1 Population Trend of Blue Sheep

A higher number of blue sheep was counted this year compared to the previous year's survey; more blue Sheep were sighted in Shimshal CCHA (Figure 12).

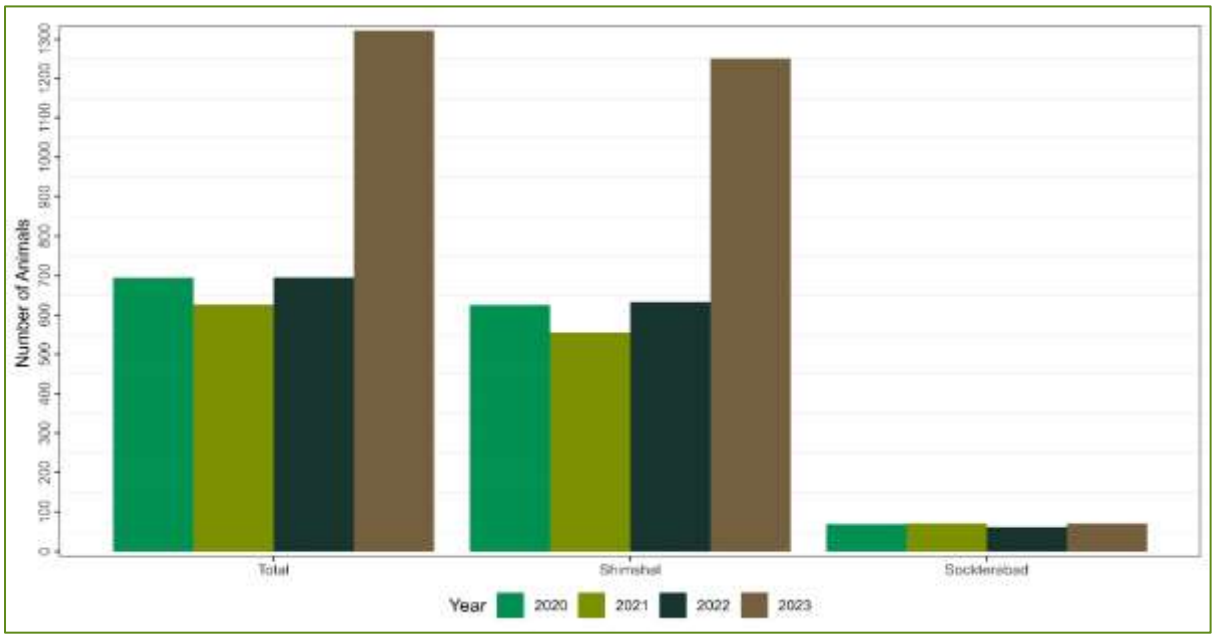

Figure 12: Four years population trend of blue sheep in CCHAs.

3.3.2 Population Trend of Himalayan Ibex

This year, a slightly lower population was estimated than the previous year, but it was higher than in 2021 (Figure 13).

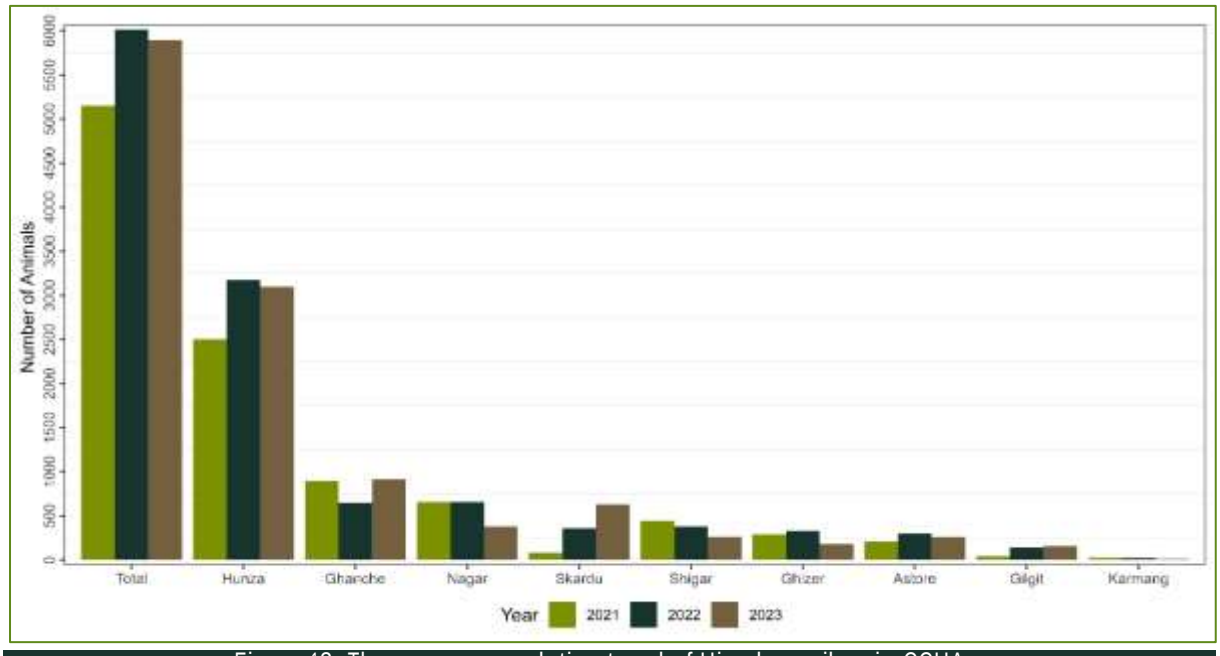

Figure 13: Three years population trend of Himalayan ibex in CCHAs.

3.4. Number of Harvestable Animals for Year 2023-24

Using the 2% of the total population rule (i.e., 1,322 blue sheep), 26 can be harvested. However, if the 25% of trophy animals (210) rule is followed, then only 52 blue sheep may be harvested in the year 2024-2025.

Similarly using 2% of the total Himalayan ibex population (i.e., 5,511) 110 Himalayan ibex can be harvested, if 25% of trophy animals (416) rule is followed then only 104 Himalayan ibex can be harvested during 2024-25 trophy hunting season.

4. DISCUSSION

Globally, wild ungulate numbers are declining due to a mix of poaching and climate-related challenges (Ali et al., 2021). Nevertheless, in numerous regions, ungulate populations have not only bounced back from near extinction but have significantly multiplied. Gilgit-Baltistan stands out as one such area where wild ungulate numbers have surged from nearly none to hundreds in just twenty years, largely credited to the effectiveness of trophy hunting (Ali et al., 2022).


Plate 11: Himalayan red fox in snow covered ibex habitat.

Regular monitoring of wild ungulate populations serves as the principal method for evaluating the efficacy of conservation endeavors in facilitating the recuperation of wildlife populations (Singh and Milner-Gulland, 2011), particularly in regions characterized by significant human reliance on natural resources (Mishra et al., 2004). In the context of Gilgit-Baltistan, trophy hunting was implemented as a measure of last resort in 1991 to mitigate the impending extinction of wild ungulate populations (Jingfors, 2000). Since then, the population of wild ungulates has exhibited a noteworthy resurgence, transitioning from sparse numbers (Virk, 1999) to thriving communities comprising thousands of Himalayan ibex (Ahmad et al., 2020), blue sheep (Khattak et al., 2019), and markhor (Haider et al., 2021). Currently, the administration of Gilgit-Baltistan provides hunting trophies for Astor markhor, Himalayan ibex, and blue sheep (Ali et al., 2022; Asif et al., 2022). Before trophy allocation, the Parks and Wildlife Department of Gilgit-Baltistan undertakes yearly monitoring assessments of wild ungulate populations to gauge the impact of trophy hunting on ecosystems and species. These evaluations are deemed integral for sustaining trophy hunting activities and delivering socio-economic advantages to underprivileged communities (Singh & Milner-Gulland, 2011). We counted 1251 blue sheep, with an estimated population of 1251 (737 – 1,790 CI). This total count of blue sheep is higher than that reported by Ali et al. (2022). The populations of blue sheep are on the rise. We observed male to female ratios of blue sheep that were more or less like those reported by Ali et al. (2022), i.e., 1.09:1.


Plate 10: Cape hare a common resident in ibex and blue sheep habitat.

We counted a total population of 5,511 Himalayan ibex individuals, with an estimated population of 5,584, which may range from 4,618 to 6,649 at a 95% Confidence Interval. The overall and estimated population is slightly lower than the population estimate reported by Ali et al. (2023). We observed a male-to-female ratio of 0.93:1 (male:female). These ratios raise concerns regarding trophy hunting; it is desirable to maintain a male-to-female ratio of 1:6, meaning for every male, there should ideally be six females (Adhikari et al., 2021; Zaman et al., 2019).

Applying the two-set trophy rules, if 2% of the total population is harvested, 26 blue sheep and 110 ibex can be harvested. If 25% of trophy-sized animals are chosen for harvesting, then 52 blue sheep and 104 ibex can be harvested (Adhikari et al., 2021; Zaman et al., 2019).

5. RECOMMENDATIONS

1. The annual surveys should continue using the double observer method, as more than half of the Parks and Wildlife Department is now trained in this method.
2. The data collection format developed for the double observer method is well-recognized by all stakeholders and should be used by every organization to collect a uniform set of data.
3. These annual surveys should be wildlife-oriented, and each team should record data on other ungulates besides the ones they are surveying, as well as any other wildlife they sight in the field.
4. The annual surveys are time and season-bound, for example, the rut for blue sheep and Himalayan ibex starts after the end of November, and snowfall starts at the same time. Therefore, the Parks and Wildlife Department should purchase more GPS, cameras, spotting scopes, and binoculars to send maximum teams to complete the surveys before the snowfall.
5. The game watchers shall be trained regularly in latest survey techniques and equipment to ensure collection of data each year.
6. Trophy shall be allocated using the IUCN guidelines agreed with communities at the inception of trophy hunting i.e., census and population based.
7. Data collected shall be entered in a database and should be publicly available.

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