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Abundance, Distribution, and Conservation Status of Himalayan Ibex (*Capra sibirica*) in the Imit Valley, Ghizer District, Gilgit-Baltistan, Pakistan

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Abstract

Purpose: To provide the first quantitative baseline on the winter population status, age–sex structure and spatial distribution of Himalayan ibex in the Community Controlled Hunting Area of Immit Valley, Ghizer district, and to assess implications for community-based trophy hunting and conservation. **Research design, data and methodology:** A late-winter ground survey was conducted using a double-observer design at nine vantage points across Immit Valley. At each sighting, observers recorded herd size, sex and age class (kids/yearlings, adult females, three male age classes), location and elevation. Duplicate detections were reconciled to obtain minimum counts, and descriptive statistics were used to summarize population structure and altitudinal use. **Results:** A minimum of 84 ibex in nine herds was recorded, with mean group size of about nine animals (range 4–19). The population comprised roughly 46% adult females, 38% adult males and 16% kids/yearlings, with most males in medium age classes and only one trophy-age male. Nearly 40% of animals occurred in two sub-valleys, and most ibex used mid- to upper-elevation south-facing slopes. **Conclusions:** Findings indicate a small but demographically mixed population whose viability may be sensitive to overharvest of scarce trophy-age males and to disturbance in core winter ranges, underscoring the need for conservative, data-driven quotas and repeated monitoring.

Keywords : Trophy hunting, Himalayan ibex (*Capra sibirica*), Immit Valley, Conservation management, Population structure

JEL Classification Code : Q57, Q26, Q28, Q20, Q56

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1. Introduction

Gilgit-Baltistan in northern Pakistan lies at the junction of the Himalaya, Karakoram and Hindu Kush ranges and supports globally important high-mountain ecosystems. These rugged landscapes harbour a diverse assemblage of large mammals, including apex carnivores such as snow leopard *Panthera uncia* and Himalayan brown bear *Ursus arctos isabellinus*, and several wild caprine and ovine ungulates that form their principal prey base (Roberts, 1999; Schaller, 1975; Khan et al., 2016a). Among these, the Himalayan ibex *Capra sibirica* is one of the most widespread mountain ungulates in the region and a key component of high-altitude food webs (Khan et al., 2016a).

The Himalayan ibex occurs across the arid and semi-arid ranges of the Himalaya, Karakoram and Hindu Kush from Afghanistan through northern Pakistan to western China and Central Asia (Shackleton, 1997; Khan et al., 2016; Khan et al., 2016b). In Pakistan it is the most numerous wild caprine, inhabiting steep rocky terrain and open alpine meadows typically between about 2,000 and 5,000 m elevation in Gilgit-Baltistan, Khyber Pakhtunkhwa and Azad Jammu and Kashmir (Roberts, 1999; Khan et al., 2015a; Forest, Wildlife and Parks Department GB, 2021). (Khan et al., 2016) Ibex show pronounced seasonal movements, using higher pastures in summer and shifting to lower, south-facing slopes during winter when snow cover and forage availability constrain habitat use (Anwar et al., 2021). (Khan et al., 2018) Although the species has historically been considered relatively secure and was classified as Least Concern at the national level, recent assessments have upgraded Asiatic ibex to Near Threatened on the IUCN Red List due to evidence of local declines and increasing anthropogenic pressures across its range (Reading et al., 2008; Sheikh and Molur, 2004).

In Gilgit-Baltistan, Himalayan ibex populations face a combination of threats that include illegal hunting and poaching, disturbance from expanding human activities, loss and degradation of natural vegetation, and competition for forage with rapidly growing livestock herds (Rasool, 1990; Khan et al., 2015; Snow Leopard Foundation, 2021-2022). At the same time, climate-driven changes in snow and vegetation patterns may be altering the quality and spatial distribution of key seasonal ranges. Remote-sensing-based analyses from parts of the Central Karakoram indicate a browning trend in alpine meadows used by ibex, which is attributed to grazing pressure and changing climatic conditions and may increase winter stress on populations (Khan et al., 2016b). These interacting pressures underscore the need for site-specific data on ibex abundance, demographic structure and habitat use to inform conservation planning.

Since the early 1990s, Gilgit-Baltistan has become a prominent case study for community-based trophy hunting as a tool for mountain ungulate conservation. Under this programme, a limited number of older males of Astore markhor *Capra falconeri falconeri*, Himalayan ibex and blue sheep *Pseudois nayaur* are legally hunted each year in community conservation areas, with approximately 80% of trophy fees returned to local communities and the remainder retained by the government (Shackleton, 1997; GoP/IUCN, 2002; Forest, Wildlife and Parks Department GB, 2022). Revenues from these hunts have grown substantially; in recent seasons, dozens of ibex and several markhor and blue sheep trophies have generated hundreds of millions of Pakistani rupees for community-controlled hunting areas and associated development and conservation projects in Gilgit-Baltistan. While this model is widely cited as a conservation success that has contributed to the recovery or stabilization of some ungulate populations, its long-term legitimacy depends on transparent quota setting, regular monitoring and robust, site-level population data.

To strengthen the biological basis for quota allocation, the Forest, Wildlife and Parks Department of Gilgit-Baltistan, often in collaboration with national and international partners, has initiated rut-season surveys for Himalayan ibex and blue sheep in several districts, including Gojal, Ghizer and Skardu. These surveys use ground counts from vantage points to estimate numbers, sex ratios and age structure over broad areas and explicitly recommend annual monitoring to ensure that harvest levels remain sustainable (Forest, Wildlife and Parks Department GB, 2021, 2022, 2024). However, many individual community-controlled hunting areas still lack peer-reviewed, fine-scale assessments of ibex population status, particularly during winter when animals aggregate on accessible slopes and are most vulnerable to hunting and disturbance. This gap is especially important in newly designated hunting areas, where baseline information on abundance and demographic structure is needed before long-term trends and harvest impacts can be evaluated.

The present study was designed in this context to provide a systematic assessment of the Himalayan ibex population in a newly designated Community Controlled Hunting Area of Imit Valley in Ghizer district, Gilgit-Baltistan. A late-winter double-observer ground count was conducted jointly by the Parks and Wildlife Department of Gilgit-Baltistan and the Snow Leopard Foundation to estimate population size, group composition and altitudinal distribution of ibex at the valley scale. Despite the ecological and economic importance of Himalayan ibex in Imit Valley, no previous study has generated quantitative, peer-reviewed estimates of its population parameters, and trophy hunting quotas have been set without robust local

data. This lack of site-specific information is the central problem that the study addresses. By providing the first systematic baseline on the winter status of Himalayan ibex in Imit Valley and situating these findings within the broader context of ungulate conservation and community-based management in Gilgit-Baltistan, the study offers evidence that can be used to evaluate current management, refine future harvest quotas and guide long-term monitoring and conservation efforts in the region.

2. Literature Review

Himalayan ibex (*Capra sibirica*, often treated locally as Himalayan or Asiatic ibex) is one of the most widespread wild caprines in northern Pakistan, occurring on steep rocky slopes and alpine pastures in the inner Himalaya, Karakoram and Hindu Kush. In Gilgit-Baltistan, valley-level studies have shown that ibex can still be locally abundant but that population parameters vary strongly with habitat and human pressure. For example, in Nagar Valley a vantage-point survey recorded 478 ibex in winter and 456 in spring, with mean group sizes around 19 animals, a female-biased sex ratio and a clear preference for south-facing, steep slopes between roughly 2,500 and 3,500 m elevation (Ali et al., 2015). These data underline that detailed counts at the valley scale are crucial for understanding local population structure and habitat use.

Alongside independent research, the Forest, Wildlife and Parks Department of Gilgit-Baltistan has carried out rut-season surveys for Himalayan ibex and blue sheep across multiple Community Controlled Hunting Areas (CCHAs), including Ghizer, Hunza and Skardu. Using vantage-point counts and, more recently, double-observer methods, these surveys estimate total numbers, sex-age structure and recommend sustainable harvest quotas for district-level management (Forest, Wildlife and Parks Department Gilgit-Baltistan, 2022). At the policy level, Gilgit-Baltistan's community-based trophy hunting programme now generates substantial revenue: in the 2023–24 season alone, about Rs 309 million was raised from markhor, ibex and blue sheep permits, with 80% of income returned to community conservation areas and 20% retained by government agencies (Nagri, 2024; Pamir Times, 2023). This model is widely promoted as a way to link ibex conservation with local livelihoods, but its success depends on reliable, site-specific biological data.

Despite this progress, many individual CCHAs and valleys still lack peer-reviewed baseline information on ibex abundance, herd composition and winter distribution. Government survey reports are valuable but are often broad in spatial scope and not easily accessible in the scientific literature. In particular, for newly designated

hunting areas such as Imit Valley, there are no published, quantitative assessments of the winter ibex population that can be directly used to evaluate quota setting or to track trends over time. The present study addresses this gap by providing a systematic, valley-scale estimate of ibex numbers, sex-age structure and altitudinal use in the Imit CCHA, thereby complementing regional surveys and strengthening the empirical basis for community-based management in Ghizer district.

3. Research Methods and Materials

3.1. Study Area

The study was conducted in Immit Valley, a side valley of the Ghizer River in Ghizer district, Gilgit-Baltistan, northern Pakistan. Immit lies within the inner Hindukush–Karakoram mountain system and is characterized by steep rocky slopes, narrow valley bottoms and a series of side gullies that drain into the main valley. Elevations in the surveyed area range from approximately 2,500 to 4,000 m above sea level, covering lower south-facing slopes used by Himalayan ibex in winter as well as higher ridges that provide escape terrain and summer foraging grounds.

The regional climate is cold and arid to semi-arid, with long, snowy winters and short, cool summers. A land-use/land-cover classification of Immit Valley (Figure 1) distinguishes three main classes: barren land, green land and houses (cultivated land and village settlements), and forest. Barren land covers much of the steep upper slopes and rocky outcrops, whereas patches of forest and green land are concentrated along the valley floor and lower slopes near villages and irrigation channels. These classes represent the principal habitat types and human land uses within the study area, and they form the landscape mosaic in which ibex herds were observed during the late-winter survey.

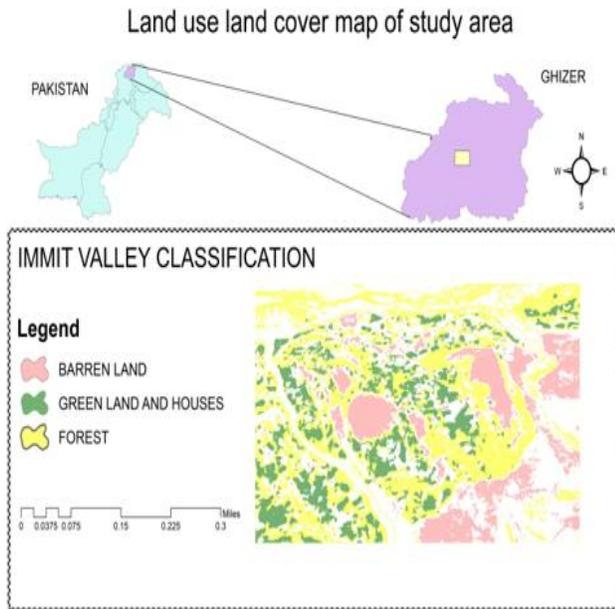


Figure 1: Location and land-use/land-cover map of the study area in Immit Valley, Ghizer district, Gilgit-Baltistan, northern Pakistan. The inset maps show the position of Ghizer within Pakistan and the location of Immit Valley within Ghizer. Land-use/land-cover classes are grouped into barren land, green land and houses (cultivated land and settlements), and forest.

3.2. Field Survey Design

Fieldwork consisted of a six-day survey conducted in late winter. The survey was timed to coincide with the post-rut season, when ibex tend to aggregate on accessible, south-facing slopes and snow conditions allow relatively good visibility of herds. To facilitate systematic coverage, the valley and its main side gullies were divided into blocks based on topographic features. Ridges, cliffs and major drainages were used as natural boundaries, under the assumption that ibex were unlikely to cross these features repeatedly during a single day. Within each block, fixed vantage points were selected that provided broad views of likely ibex habitat, including steep rocky slopes, cliff bands and adjacent foraging areas.

A double-observer ground count method, commonly used for ungulate surveys in rugged terrain, was employed to estimate ibex abundance and describe group composition. Two independent observers (A and B) traversed pre-defined routes and scanned from the same vantage points, maintaining an approximately 15-minute temporal separation to minimize direct visual contact and cueing. Both observers walked the same trails, stopping at vantage points to scan all accessible slopes and ridges with binoculars and a spotting scope. If observer B approached a position where observer A was still visible, observer B

waited out of sight until observer A had moved on, so that detections remained as independent as possible.

3.3. Data Recording and Classification

At each observation of ibex, observers recorded the time, vantage point name, geographic coordinates of the herd (using a handheld GPS), estimated altitude, slope aspect, habitat type, and group size. Animals were classified into demographic categories based on horn size and body characteristics using standard field criteria: kids or yearlings, adult females, younger adult males (approximately 2–3 years), prime-age adult males (4–6 years), and older trophy males (7 years or more). For each herd, the number of individuals in each sex and age category was noted.

At the end of each survey day, the two observers compared their field sheets to identify duplicate sightings of the same herd. Herds were considered duplicates if they matched closely in location, altitude, group size and composition within a short time window. Duplicate records were reconciled and merged, while unique herds seen by only one observer were retained as separate detections. This double-observer capture–recapture framework allowed us to reduce the risk of double counting and to improve the reliability of the total population estimate for the survey period.

3.4. Data Analysis

Data were entered into a spreadsheet for analysis. Descriptive statistics were used to summarize total ibex numbers, the number of herds, herd size distribution and the proportion of animals in each sex and age category. Group size was described using mean, range and standard deviation. Sex and age structure were expressed as percentages of the total population and as sex ratios (e.g. males per 100 females, kids per 100 females).

To describe vertical habitat use during late winter, ibex observations were grouped into altitudinal bands corresponding to major habitat zones in the valley (for example 2,500–3,600 m and 3,500–4,000 m). The number of individuals recorded in each band was summarized and compared to identify the altitudinal range most frequently used during the survey. The distribution of herds across vantage points and blocks was examined to highlight local hotspots of ibex occurrence that may be particularly important for conservation and for the setting of trophy-hunting quotas. All analyses were conducted using Microsoft Excel.

Table 1: Minimum counts and age–sex composition of Himalayan ibex recorded at nine vantage points in Immit Valley, Gilgit-Baltistan, during the late-winter double-observer survey.

S#	Vantage point	Coordinates	K/YL	AF	M1	M2	M3	Total
1	Bilhanz	N 36° 31.742'; E 073° 05.9984'	1	4	0	3	0	8
2	Gulmain	N 36° 03.373'; E 074° 00.078'	0	3	0	2	0	5
3	Badswat Shariroi	N 36° 32.1830'; E 074° 01.7520'	1	2	2	3	0	8
4	Badswat Nalla	N 36° 01' 5"; E 74° 02' 36"	4	8	3	4	0	19
5	Bazar koto	N 36° 08.263'; E 073° 07.3811'	2	8	3	2	0	15
6	Matharamdan	N 36° 39.024'; E 074° 03.065'	0	2	0	2	0	4
7	Boiser	N 36° 39.635'; E 074° 02.820'	1	5	1	2	0	9
8	Colgas	N 36° 39.629'; E 074° 02.820'	1	2	0	0	1	4
9	Iloggas	N 36° 49.628'; E 074° 02.821'	3	5	2	2	0	12

Note: K/YL = kids and yearlings; AF = adult females; M1 = 2–3-year-old males; M2 = 4–6-year-old males; M3 = ≥7-year-old males (trophy class)

4. Results and Discussion

4.1. Population Size and Age–Sex Structure

The late-winter double-observer survey in Immit Valley recorded a minimum count of 84 Himalayan ibex in nine herds, distributed across nine vantage points (Table 1, Figure 2). Herd size ranged from 4 to 19 animals (mean \pm SD = 9.3 ± 5.1 individuals, $n = 9$). Most herds (6 of 9; 66.7%) contained fewer than 10 animals, whereas only two large aggregations of 15 and 19 ibex were observed (Table 1). This mean group size is somewhat lower than values reported from larger and more intensively monitored populations in Nagar Valley (winter mean 19.1 individuals per group) and Hushey Valley in Central Karakoram National Park (typical group size 18, mean 13 individuals), where ibex occur at higher densities and form larger mixed herds during winter.

Overall, the counted population comprised 13 kids and yearlings (15.5%), 39 adult females (46.4%) and 32 adult males (38.1%; Table 1). When expressed as ratios, this corresponds to approximately 33 juveniles and 82 adult males per 100 adult females. The proportion of adult males in Immit Valley (38%) appears higher than that reported from Hushey Valley, where winter counts contained 29% adult males and 28% adult females. In contrast, the relative representation of kids and yearlings combined in Immit (15.5% of all animals) is lower than in some other Pakistani ibex populations where young comprised 30–38% of winter herds, suggesting moderate but not exceptionally high recent recruitment.

Within the adult male segment, age-class structure was skewed toward medium-aged animals (Table 1). A total of 11 males (34.4% of all males) were classified as M1 (approximately 2–3 years old), 20 males (62.5%) as M2 (4–6 years old), and only one individual (3.1%) as M3 (≥7-

year-old trophy-size male). The numerical scarcity of the oldest trophy-size males is noteworthy because this age class is preferentially targeted in community-based trophy hunting programmes throughout Gilgit-Baltistan and elsewhere in the species' range.

4.2. Spatial Distribution Among Vantage Points

Ibex were detected at all nine vantage points, but counts varied markedly among sites (Table 1, Figure 2). The largest concentration was recorded at Badswat Nalla, where a mixed herd of 19 animals (4 kids/yearlings, 8 adult females and 7 adult males) accounted for 22.6% of all individuals observed. The second-largest aggregation occurred at Bazar Koto, with 15 ibex (2 kids/yearlings, 8 adult females and 5 adult males, 17.9% of the total). Together, these two locations supported about 40% of all ibex recorded during the survey, indicating that they are key wintering areas within the Community Controlled Hunting Area (CCHA) of Immit Valley.

Intermediate counts were obtained from Boiser (9 ibex) and Iloggas (12 ibex), whereas smaller herds of 4–8 animals were found at Bilhanz, Gulmain, Badswat Shariroi, Matharamdan and Colgas (Table 1). The spatial pattern depicted in Figure 2 shows a pronounced peak in abundance at Badswat Nalla and Bazar Koto, with substantially lower numbers at the remaining vantage points. Similar small-to-medium sized herds clustered around a few high-use winter ranges have been reported for ibex elsewhere in Gilgit-Baltistan and in other parts of the Karakoram–Pamir system.

4.3. Altitudinal Distribution

Elevation was recorded for a subset of herds corresponding to 74 individually counted ibex. Of these, 35 animals (47.3%) were observed between approximately

2,500 and 3,600 m a.s.l., while 39 animals (52.7%) occurred between about 3,500 and 4,000 m a.s.l. During the January survey period, most ibex thus used mid- to upper-elevation south-facing slopes, where snow cover remained patchy and forage was still accessible but escape terrain was nearby. This vertical distribution pattern is broadly consistent with previous studies in Gilgit-Baltistan and neighboring regions, which have shown that ibex descend from high-elevation summer ranges to lower, drier slopes with less snow accumulation during winter.

These results indicate that the Immit Valley CCHA currently supports a small but demographically mixed winter population of Himalayan ibex, with herds concentrated in a limited number of wintering areas and a relatively low proportion of old trophy-size males. These quantitative baselines provide a starting point for evaluating the sustainability of existing trophy hunting quotas and for designing future monitoring of ibex populations in the valley and surrounding landscapes.

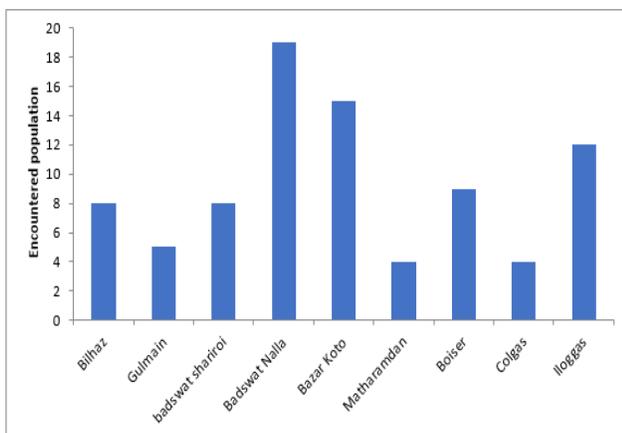


Figure 2: Total number of Himalayan ibex recorded at each vantage point in Immit Valley

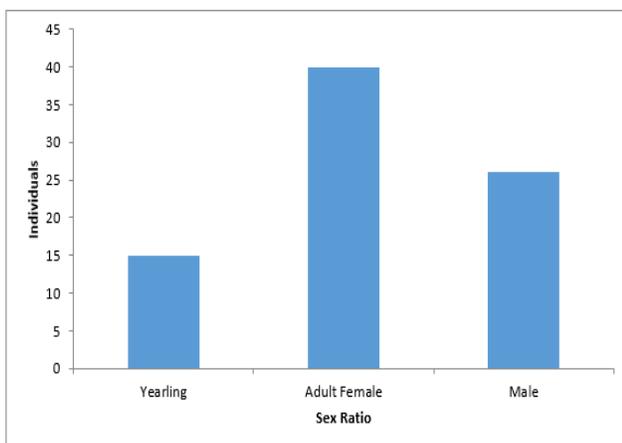


Figure 3: Sex and age structure of the Himalayan ibex

5. Discussion

The survey in Immit Valley provides a first quantitative picture of the winter status of Himalayan ibex in this newly designated Community Controlled Hunting Area. The minimum count of 84 individuals in nine herds (Table 1, Figure 2) indicates that the valley supports a small but demographically mixed population. Mean group size (about 9 animals per herd) is lower than winter group sizes reported from Nagar and parts of Central Karakoram National Park, where ibex herds often average 13–19 individuals (Ali et al., 2015; Khan et al., 2014). This difference may reflect lower overall density, more fragmented winter habitat, or stronger disturbance and hunting pressure in Immit compared with larger, better-protected valleys.

The age–sex structure, with approximately 46% adult females, 38% adult males and 16% kids and yearlings (Table 1), is broadly consistent with a demographically stable population and with patterns described for other Asian ibex populations, where females dominate mixed winter groups and juveniles form a minority of the herd (Fedosenko and Blank, 2001; Ali et al., 2015). However, the relatively low proportion of young compared with some other valleys in Gilgit-Baltistan suggests that recruitment may be moderate rather than high, and should be followed up with repeated surveys. The internal structure of the male cohort is particularly important for management: most males in Immit were classified as medium-aged (M2), while only one individual was identified as a ≥ 7 -year-old trophy male (M3). Given that community-based hunting programmes in Gilgit-Baltistan are designed to remove only old males (Molur, S. 2003; Ahmad et al., 2020), the very small pool of trophy-age animals in this valley argues for highly conservative, site-specific quotas and careful monitoring of male age classes over time.

Spatially, almost 40% of all ibex were concentrated in two sub-valleys, Badswat Nalla and Bazar Koto (Table 1, Figure 2), which appear to provide key winter habitat combining south-facing slopes, accessible forage and nearby escape terrain. Similar concentration of wintering ibex in a limited number of high-use areas has been reported from other parts of the Karakoram and Pamir (Ali et al., 2015; Khan et al., 2016). Protecting these core winter ranges from excessive disturbance, infrastructure development and unsupervised hunting will be essential if the Immit population is to remain viable under increasing human and climatic pressures. The observed use of mid- to upper-elevation slopes is consistent with known winter movements of *Capra sibirica*, which typically descends from very high summer pastures to drier, less snow-covered slopes in winter (Fedosenko and Blank, 2001;

Khan et al., 2016). Any future changes in grazing intensity or vegetation productivity in these elevation bands, for example under climate or land-use change, could therefore have a disproportionate impact on ibex in this CCHA. Overall, the present results complement broader regional surveys by providing fine-scale, valley-level information that can be directly linked to quota allocation and local conservation planning. They suggest that, while Immit currently holds a viable winter population of ibex, the small absolute numbers and limited availability of trophy-age males require a precautionary approach to hunting and a strong emphasis on long-term monitoring and habitat protection.

This study is based on a single late-winter survey and provides minimum counts rather than modelled abundance estimates; population size and structure may vary between years and seasons. Double-observer methods reduce, but do not eliminate, the risk of double counting or missing animals in rugged terrain. Age classification of males into M1, M2 and M3 was based on horn and body characteristics in the field and may include some misclassification, especially near class boundaries. Future work should therefore repeat surveys across multiple years and seasons, and where possible apply analytical frameworks that explicitly account for detection probability.

6. Conclusions

The winter survey in the Community Controlled Hunting Area of Immit Valley, Ghizer district, establishes a first quantitative baseline for Himalayan ibex, revealing a small but demographically mixed population of at least 84 individuals, dominated by adult females with moderate recruitment, a male cohort skewed toward medium-aged animals and very few true trophy-age males, and herds concentrated in a limited number of core wintering sub-valleys. Taken together, these patterns suggest that the population is currently viable but could become vulnerable if the limited pool of older males is repeatedly targeted by trophy hunting or if disturbance, grazing pressure and land-use change degrade key winter slopes; accordingly, hunting quotas should remain highly conservative, explicitly tied to up-to-date age-structure data, and implemented alongside strict control of illegal offtake and focused protection of the main wintering areas identified in this survey. Future work should extend this baseline through repeated surveys across years and seasons to detect trends in abundance and recruitment, apply analytical methods that account for imperfect detection, integrate ground counts with remote-sensing indicators of vegetation and grazing to anticipate habitat change, and incorporate social and economic research on community perceptions, benefit-sharing and

compliance so that biological information and local incentives are jointly used to secure the long-term conservation of Himalayan ibex in Immit Valley and adjacent landscapes.

References

- Ahmad, S., Khan, T. U., Hacker, C., Yang, L., Nabi, G., Ullah, S., ... & Luan, X. (2020). Critical assessment of Asiatic ibex (*Capra ibex sibirica*) for sustainable harvesting in northern areas of Pakistan. *Global Ecology and Conservation*, 22, e00907.
- Ali, H., Anwar, M., & Nawaz, MA (2015). Population density and habitat use of Himalayan ibex (*Capra sibirica*) in Nagar Valley, Gilgit-Baltistan, Pakistan. *International Journal of Conservation Science*, 6(4), 707–714.
- Anwar M. 2011. Selected Large Mammals. In: Akbar G and Anwar M, eds. *Wildlife of Western Himalayan Region of Pakistan*. WWF – Pakistan, Islamabad.
- Fedosenko, A. K., & Blank, D. A. (2001). *Capra sibirica*. *Mammalian Species*, 675, 1–13.
- Forest, Wildlife and Parks Department Gilgit-Baltistan. (2021–2022). Himalayan ibex and blue sheep in Gilgit-Baltistan, Pakistan: Rut season survey report 2021–22. *Forest, Wildlife and Parks Department, Government of Gilgit-Baltistan*.
- GoP/IUCN (2002). State of Environment and Development in Northern Areas. IUCN Pakistan, Karachi, pp 68–77.
- Khan, B., Ablimit, A., Khan, G., Jasra, AW, Ali, H., Ali, R., & Ismail, M. (2016). Abundance, distribution and conservation status of Siberian ibex, Marco Polo and blue sheep in Karakoram-Pamir mountain area. *Journal of King Saud University – Science*, 28, 216–225.
- Khan, B., Ablimit, A., Khan, G., Jasra, A. W., Ali, H., Ali, R., ... & Ismail, M. (2016). Abundance, distribution and conservation status of Siberian ibex, Marco Polo and Blue sheep in Karakoram-Pamir mountain area. *Journal of King Saud University-Science*, 28(3), 216–225a.
- Khan, G., Khan, B., Qamer, F. M., Abbas, S., Khan, A., & Xi, C. (2016). Himalayan ibex (*Capra ibex sibirica*) habitat suitability and range resource dynamics in the Central Karakorum National Park, Pakistan. *Journal of King Saud University-Science*, 28(3), 245–254b.
- Khan, M. Z., Awan, M. S., Bocci, A., Khan, B., Abbas, S. Y., Khan, G., & Abbas, S. (2014). Population structure and grouping tendency of Asiatic ibex *Capra sibirica* in the Central Karakoram National Park, Pakistan. *Journal of Biodiversity and Environmental Sciences*, 5(2), 542–554.
- Khan, M., Siddiqui, P. A., Raza, A., & Zahler, P. (2018). Status of flare-horned markhor (*Capra falconeri falconeri*) in Jutial Conservancy, District Gilgit, Gilgit-Baltistan (previously northern areas), Pakistan. *International Journal of Biology and Biotechnology*, 15(2), 343–349.
- Molur, S. (2003). Status and Red List of Pakistan's Mammals.
- Nagri, J. (2024, May 13). GB trophy hunt.
- Pamir Times. (2023, June 25). Conservation and community benefits of trophy hunting in Gilgit-Baltistan, Pakistan. *Pamir Times*.

- Rasool, G., 1990. Population status of wildlife in Khunjerab National Park (Pakistan). Tiger Paper 17, 25-28.
- READING, R. AND SHANK, C., 2008. *Capra sibirica*. In: IUCN 2014. IUCN red list of threatened species.
- READING, R. AND SHANK, C., 2008. *Capra sibirica*. In: IUCN 2014. IUCN red list of threatened species.
- Roberts, T. J. (1999). A note on *Capra falconeri* (Wagner, 1839).
- Schaller, G. B., & Khan, S. A. (1975). Distribution and status of markhor (*Capra falconeri*). *Biological Conservation*, 7(3), 185-198.
- SHEIKH, K.M. AND MOLUR, S., 2004. (Eds.) Status and red list of Pakistan's Mammals. based on the conservation assessment and management plan. IUCN Pakistan, pp. 312.
- Shackleton, D. M. (1997). Wild sheep and goats and their relatives: status survey and conservation action plan for Caprinae.