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Characterizing the illegal trade of carnivores on a social media platform in Iran

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ABSTRACT

Illegal wildlife trade threatens biodiversity globally and has become more accessible through social media, where traffickers reach buyers in minimally regulated spaces. Despite Iran's strategic location on major trade routes, little is known about its wildlife markets, particularly on online platforms and in Persian-language contexts. This study examines the illegal trade of native and non-native carnivores on Instagram in Iran using data from 293 public advertisements posted throughout 2022. Non-native species, such as lions, were more prevalent in the live animal trade, while native species, like red foxes, were more often advertised for their body parts. Trade in native species exhibited a significant seasonal peak in spring and summer, aligning with birthing seasons. In contrast, trade in non-native species showed no significant seasonal trend, suggesting sourcing through international or captive networks. To understand marketing strategies, we conducted a reflexive thematic analysis of Persian-language captions and photos. Four key themes emerged: commodification of wildlife, normalization of captivity, status signalling, and controlled access. Sellers emphasized tameness, luxury appeal, and exclusivity to attract consumers, while rarely mentioning biological traits. The advertisements portrayed wild animals as desirable consumer products, obscuring their conservation status and the ethical implications of using them. Our findings underscore the urgent need for enhanced monitoring in non-English contexts, targeted enforcement during peak seasons, and platform-level interventions to disrupt the online wildlife trade in underregulated regions, such as Iran.

1. Introduction

The illegal wildlife trade poses a significant threat to global biodiversity, jeopardizing conservation efforts and the survival of species (Challender et al., 2015; Esmail et al., 2020; Hughes, 2021; Sung et al., 2021; Sung and Fong, 2018). Among all wildlife, mammalian carnivores face intense pressure as they are highly sought after in global markets for use in traditional medicine, as luxury items, and as exotic pets (Arias et al., 2024; Baker et al., 2013; Hinsley et al., 2023). The impact of illegal wildlife trade extends beyond contributing to population declines and habitat loss (Bush et al., 2014). It also disrupts food chains, spreads invasive species, and increases the risk of diseases that can spread from animals to humans, making conservation efforts even more urgent (Fong and Chen, 2010; Ikeda et al., n.d.; Jones et al., 2008; Pavlin et al., 2009; Shivaprakash et al., 2021).

Social media platforms have profoundly transformed the dynamics of the illegal wildlife trade by providing perpetrators with direct and often unregulated access to a global market (Feddema et al., 2020; De La Torre et al., 2025). Platforms like Instagram, Telegram, and WhatsApp allow sellers to connect directly with buyers in digital spaces that usually lack regulatory oversight (Sardari et al., 2022; Wyatt et al., 2022). For instance, platforms such as WhatsApp have facilitated the increase in illegal wildlife trade in Brazil, highlighting gaps in monitoring and enforcement strategies for digital markets (Wyatt et al., 2022). Recent studies, such as De La Torre et al. (2025), have shown that the illegal trade of wild felids in Mexico has expanded through platforms like

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Facebook, illustrating how social media facilitates transnational trafficking networks. These platforms also enable transboundary trafficking, connecting sellers and buyers across national borders through minimally monitored online networks (Polisar et al., 2023; De La Torre et al., 2025). Similarly, Instagram, Telegram, and marketplace websites have emerged as covert channels for advertising and selling protected wildlife in Iran, often bypassing local regulatory systems and enforcement mechanisms (Sardari et al., 2022; Badelu et al., 2025).

Monitoring the illegal wildlife trade on social media presents unique challenges, including the use of private or encrypted groups for transactions, as well as evading traditional banking systems and regulatory frameworks (Hinsley et al., 2016; Polisar et al., 2023; Morcatty et al., 2024). A study in Lebanon demonstrated that poachers use public social media platforms to showcase illegal hunting activities, often without fear of legal repercussions, highlighting the difficulty of enforcing wildlife laws in digital spaces (Raine et al., 2025). Poachers were present in 44 % of the photos, of which 89 % were identifiable in the posts. However, enforcement was limited due to a lack of systematic monitoring, low capacity among authorities, and inadequate action by platforms despite their policies being violated. Moreover, ethical considerations complicate online research, as conventional research guidelines often fail to address privacy, consent, and data security issues when studying illegal activities in digital environments (Morcatty et al., 2024).

While social media research is gaining traction in conservation science, the existing literature primarily focuses on English-language platforms and regions, such as Europe, North America, and Southeast Asia, leaving areas like Central Asia and non-English regions critically understudied (Amano et al., 2021). Understanding the role of captions and keywords in online wildlife trade is vital due to the powerful influence of social media on consumer choices (Feddema et al., 2020). Visual content and captions play a crucial role in shaping consumer perceptions, often emphasizing exclusivity, tameness, or luxury appeal to enhance the desirability of rare and endangered species (Feddema et al., 2020; Siriwat et al., 2019). Investigating these textual and visual components is crucial for identifying consumer motivations and designing targeted conservation campaigns to counteract demand while raising awareness of the ethical and ecological consequences of exotic pet ownership (Siriwat et al., 2019; Spee et al., 2019). However, the role of captions and keywords in wildlife trade has not been studied in non-English-speaking countries such as Iran, a country at the crossroads of major wildlife trade routes in Asia (Farhadinia et al., 2019), where the illegal online trade of native and non-native carnivores remains poorly understood. Iran's proximity to major trade routes, such as the Silk Road, can increase the likelihood of wildlife from Iran being exploited for international markets, making it a particularly important region to study (Farhadinia et al., 2019).

Under the law in Iran, the trade of any wild animal, including carnivores, whether live or in parts, is prohibited, particularly for native carnivore species, with no legal provisions allowing their commercial exchange (IPRC, 2025). This means that all such activities, regardless of the species' origin, constitute offenses under national legislation and fall within the scope of illegal wildlife trade, as used in this study (IPRC, 2025). Here, we specifically examine actors directly engaged in the trade by publicly advertising carnivores for sale on Instagram. We recognize, however, that the broader social media–facilitated wildlife trade also involves other stakeholders, such as consumers, intermediaries, breeders, and transporters, whose roles, while not analyzed here, contribute to sustaining these markets.

In Iran, 31 carnivore species have been recorded across eight families (Felidae, Canidae, Hyaenidae, Herpestidae, Mustelidae, Ursidae, Phocidae, and the introduced Procyonidae) (Yusefi et al., 2019). Of the 29 currently native taxa (excluding the introduced raccoon and two species that have been extirpated locally, lion and tiger), about six are listed as globally threatened (21 %). Roughly 27 % of Iran's currently native carnivores are considered threatened according to the Iran Regional Red List (Yusefi et al., 2019). Two large felids, the Caspian tiger (*Panthera tigris tigris*) and the Asiatic lion (*Panthera leo persica*), are now extinct in the wild in Iran (Yusefi et al., 2019; IUCN, 2024). The Asiatic cheetah (*Acinonyx jubatus venaticus*) is found solely in Iran and is classified as Critically Endangered both globally and regionally, with a remnant population confined to a few arid steppe landscapes under intensive protection (Yusefi et al., 2019). Similarly, the Baluchistan black bear (*Ursus thibetanus gedrosianus*) is assessed as Critically Endangered regionally (Yusefi et al., 2019).

Comparing the trade of native and non-native species is important because these groups often differ in their sourcing, market demand, and susceptibility to seasonal availability. Native species are more likely to be captured from local wild populations, leading to trade peaks that often coincide with breeding or birthing seasons (Sardari et al., 2022; Toomes et al., 2023). In contrast, non-native species are typically sourced from captive facilities or international trafficking networks that operate independently of local ecological cycles (Toomes et al., 2023). Understanding these distinctions can help identify drivers of trade, predict temporal patterns, and inform targeted enforcement and conservation strategies.

The present study explores the illegal online trade of native and non-native carnivores in Iran by analysing Instagram posts collected over a year. It identifies the species involved and the differences between native and non-native carnivore trade, such as trade volume, species composition, and seasonal trends. Finally, this study analyses how traffickers market carnivores on Instagram. The findings aim to support conservation efforts by providing actionable insights for policy development, enforcement, and public awareness initiatives.

2. Materials and methods

2.1. Ethical approval

Although the posts we analyzed were publicly available, we took strict measures to ensure the anonymity of online sellers throughout the data collection process (Morcatty et al., 2024). No personally identifiable information was collected or disclosed at any stage. To protect the confidentiality of individuals involved, we adhered fully to the ethical guidelines approved by the Human Research Ethics Committee of the University of Jiroft (Approval Code: 140–251). It is also important to note that most online sellers operate through anonymous profiles and intermediaries for sales and delivery.

2.2. Data acquisition

For this study, we defined carnivores as mammals belonging to the order Carnivora. We collected and recorded data on every species across carnivore families. We defined native species as those currently distributed in Iran, and non-native species as those that are not present in Iran. Lions and Tigers were considered non-native species, as they had been extinct in Iran for more than 100 years and are no longer present in the country (Yusefi et al., 2019).

We chose Instagram (https://www.instagram.com) for data collection, given its popularity among Iranian users and visual nature. Data collection began on January 1, 2022, and concluded on December 31, 2022, to ensure consistent gathering throughout the year. Instagram offers users the opportunity to share their content through both posts and stories. Posts on Instagram are permanent unless the user or Instagram deletes the post. However, stories are temporary, lasting only 24 h before they automatically disappear.

We followed the opportunistic browsing approach described by Sardari et al. (2022), systematically reviewing Instagram posts and stories daily until we reached saturation, which is defined as repeatedly encountering duplicate content. Each browsing session typically lasted approximately two hours. It is important to note that our data collection occurred at midnight in the Iran time zone. In total, we spent

approximately 725 h collecting data from Instagram. The third author conducted all data collection to ensure consistency and accuracy. We also created and used a separate Instagram account exclusively for this study to minimize algorithmic bias and maintain standardized search conditions throughout the year. We did not consider the daily temporal pattern of the posts since it was impossible due to the dynamic nature of social media. On Instagram, pages are managed by one or multiple administrators who post content that can be tagged with relevant hashtags or keywords. Users can filter through the vast amount of Instagram content by searching for specific hashtags of interest. Wildlife sellers entice potential clients by using hashtags in their posts.

We used relevant keywords in Persian (Iran's national language) to find accounts and posts selling carnivores. These keywords included variations of the word "sell," such as "sell", "for sale", and "selling", combined with different common species names in Persian. For instance, we used hashtags like #fox_for_sale in Persian (Table S1). Leveraging Instagram's search algorithms, we explored an entire network of pages. As we continued our search, Instagram suggested similar pages based on our interests. We often discovered additional sources to track and follow by adding each new page to our network. However, rather than only analysing posts made after discovery, we reviewed all relevant posts these accounts had shared throughout the entire study period (January 1 to December 31, 2022). This approach reduces the likelihood that the temporal pattern we observed is simply an artifact of accumulating more sources over time. Even if a source had only posted a few advertisements for selling wildlife, we tracked them and recorded their content. To

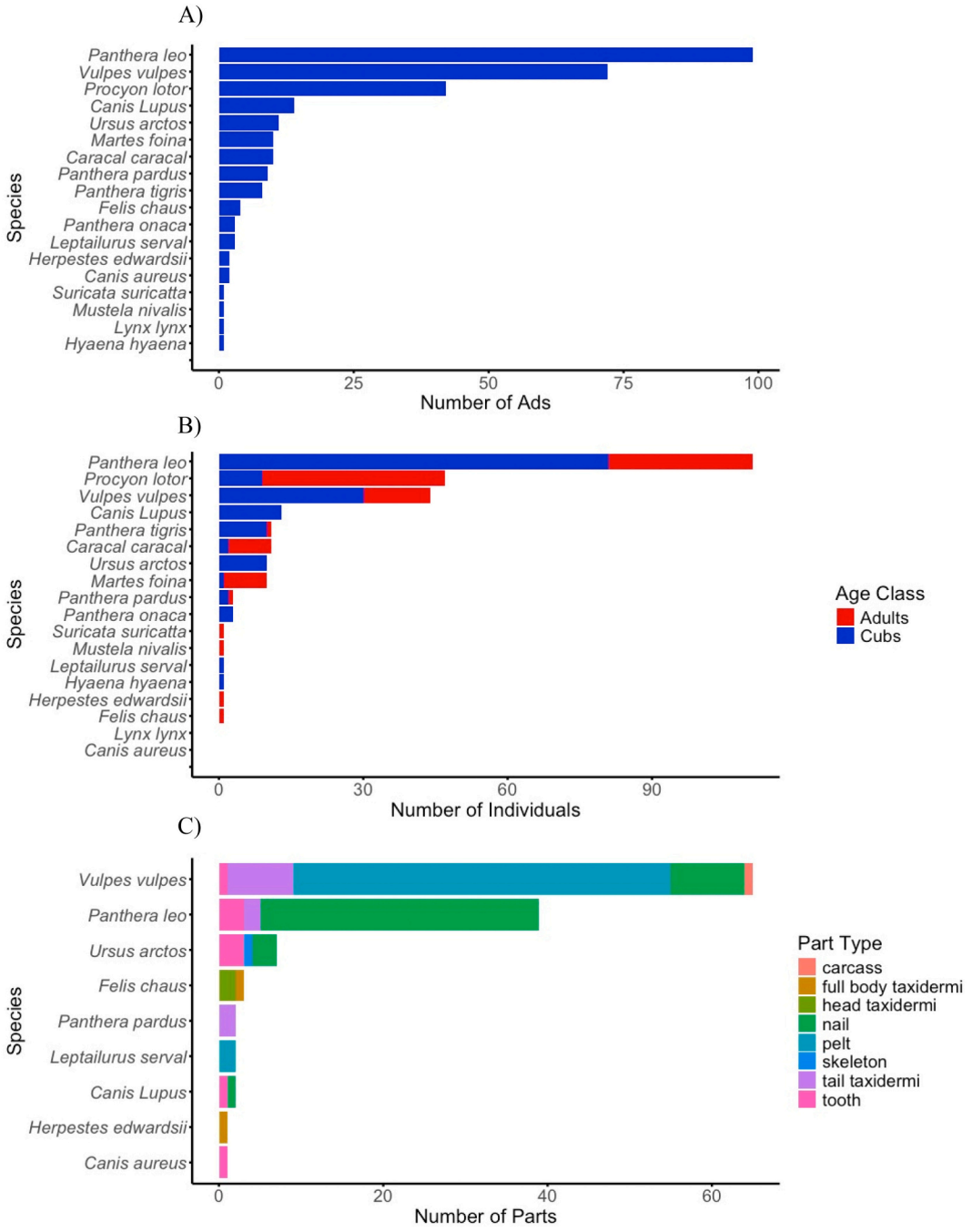


Fig. 1. A) Number of advertisements per species, B) Number of live animals advertised on Instagram per species. C) Number of animal parts advertised on Instagram per species.

avoid duplicating data, we cross-checked each record with our existing dataset. We disregarded any additional duplicates if a record had already been collected for the day. Moreover, once we reached a saturation point in our search on a particular day, we ceased searching for that day. When we resumed our search the following day, we consistently found new advertisements to gather.

We collected the date of posts and stories, captions, the advertised species' names, the number of individual animals in the advertisement, the age class of the particular animal(s) in the advertisements, the global and regional species rank on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (http://www.iucnredlist.org, 2024), the population trend according to the IUCN Red List (http://www.iucnredlist.org, 2024), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) status (https://www.cites.org, 2024) of the species from all wildlife selling posts. At the regional level, where detailed data for Eastern Europe and Central Asia were limited, we referred to Yusefi et al. (2019) for the evaluation of the conservation status of mammals in Iran. It should be noted that we divided the age classes based on the visible physical characteristics of the animals shown in the advertisements' photos (i.e., the relative size of the animal to its surroundings, closed or open eyes, visibility of reproductive organs, and secondary characteristics such as lion's mane) into two categories: juveniles and adults.

We documented both the trade of live and dead animals (e.g., animal parts such as pelts, nails, claws, skulls, and taxidermies, see Fig. 1C for the complete list of parts), as both types of trade are prohibited in Iran (IPRC, 2025). Some species mentioned in the advertisements were misidentified or not identified by the sellers; the authors identified the species to the species level based on the provided photos.

2.3. Thematic analysis of captions and images

We used reflexive thematic analysis to analyse Instagram posts advertising carnivores for sale. We chose this method for its flexibility and interpretive depth in identifying and analysing patterns of meaning within qualitative datasets (Braun and Clarke, 2006; Clarke and Braun, 2013). Reflexive thematic analysis treats coding as an active and iterative process where meaning is co-constructed through data engagement rather than discovery (Braun et al., 2014). The first author conducted the first coding, following the recursive, six-phase approach outlined by Braun and Clarke (2006): data familiarization, generating initial codes, theme searching, reviewing themes, naming and defining themes, and producing the report. Inductively, codes were derived from textual and visual content (i.e., captions and imagery), ensuring the analysis remained grounded in the data. The first author engaged in three rounds of re-coding and theme refinement to maintain analytic rigor. The second author, who was not involved in the initial coding sessions, independently reviewed the codes and thematic structure and commented on the themes proposed by the first author; this review and revision process was repeated twice. We did not use this reflexive process to establish coder reliability, a concept inconsistent with reflexive thematic analysis, but rather to challenge assumptions, strengthen interpretive coherence, and enhance the credibility of the themes (Braun et al., 2014). This collaborative review critically discussed and revised themes for consistency, clarity, and analytical depth. This approach aligns with a contextualist epistemology that acknowledges the socio-cultural construction of knowledge (Burr, 2003; Clarke and Braun, 2013). Reflexivity is necessary for this process, as well as recognizing the researcher's influence on interpretation and transparency in how themes are generated and understood (Clarke and Braun, 2013).

2.4. Statistical analysis

All statistical analyses were conducted in R (R Core Team, 2024), with significance assessed at an α level of 0.05. Initial normality checks using the Shapiro-Wilk test indicated that the advertisement count data for native species were not normally distributed ($W = 0.848$, $P = 0.035$), while the non-native species data were normal ($W = 0.902$, $P = 0.167$). To address this, we log transformed the data (native: $W = 0.955$, $P = 0.706$; non-native: $W = 0.902$, $P = 0.168$). Levene's test for homogeneity of variances confirmed that the log transformed data had equal variances across species origins ($F_{1,22} = 0.038$, $P = 0.848$). We therefore used separate one-way ANOVA models to assess the effects of season on log-transformed advertisement counts for native and non-native species groups. Effect sizes for the ANOVA models were calculated using eta-squared (η^2), which represents the proportion of the total variance explained by each factor. Significant effects were further evaluated using Tukey's Honest Significant Difference test for pairwise seasonal comparisons. Additionally, independent two-sample *t*-tests were conducted to compare advertisement counts between native and non-native species within each season. Seasons were defined as follows: Winter (December, January, February), Spring (March, April, May), Summer (June, July, August), and Fall (September, October, November).

3. Results

Over the course of one year, we collected 293 advertisements selling carnivores from 56 accounts. Of these, 76.1 % were for live animals, while 23.9 % were for dead animals or animal parts (Table 1). Our surveys found 269 live individuals and 144 animal parts (Table S2).

3.1. Overview of native species advertisements

Red Fox (*Vulpes vulpes*) had the highest number of live native advertisements, with 38 (48.1 % of the live native species advertisements). Followed by Caracal (*Caracal caracal*) and Beech Marten (*Martes foina*), each with 10 advertisements (12.6 % of the live native species advertisements). A total of 44 Red Foxes (31.8 % adults and 68.2 % cubs), 13 Gray Wolves (*Canis lupus*) pups, and 11 Caracals (81.8 % adults and 18.2 % cubs) were documented in the advertisements for live animals (Fig. 1. A and B).

Among the advertisements for dead native species, the Red Fox (*Vulpes vulpes*) had the highest number, accounting for 34 (58.6 % of the advertisements for dead native species). Other species with notable numbers of animal part advertisements included the Leopard (*Panthera pardus*) and the Brown Bear (*Ursus arctos*), each with 6 (10.3 % of the dead native species advertisements), and the Gray Wolf (*Canis lupus*), with 5 (8.62 % of the live native species advertisements).

Red Fox (*Vulpes vulpes*) had the highest number of animal parts listed for sale, with 69 parts in total. These included 66.7 % pelts (46 parts), 13.0 % nails (9 parts), 11.6 % tail taxidermies (8 parts), 4.4 % skulls (3 parts), and 1.5 % each for carcass, tooth, and claw taxidermy (1 part each). The Leopard (*Panthera pardus*) followed with 10 parts, consisting of 70.0 % claw taxidermies (7 parts), 20.0 % tail taxidermies (2 parts), and 10.0 % skulls (1 part) (Fig. 2. A). The Brown Bear (*Ursus arctos*) also had 10 parts, comprising 30.0 % nails (3 parts), 30.0 % skulls (3 parts), 30.0 % teeth (3 parts), and 10.0 % for a partial skeleton (1 part) (Fig. 2. B). The Gray Wolf (*Canis lupus*) had 6 parts, including 66.7 % teeth (4 parts), 16.7 % skulls (1 part), and 16.7 % nails (1 part; Fig. 1. C).

Globally, 83.3 % of native species advertised were listed as Least Concern (e.g., Golden Jackal (*Canis aureus*), Beech Marten), 8.3 % as

Table 1
Number of advertisements for native and non-native carnivores.

	Native	Non-native	Total
Number of live animals' ads	79 (27.0 %)	144 (49.1 %)	223 (76.1 %)
Number of dead animal/body part ads	58 (19.8 %)	12 (4.1 %)	70 (23.9 %)
Total	137 (46.8 %)	156 (53.2 %)	293 (100 %)

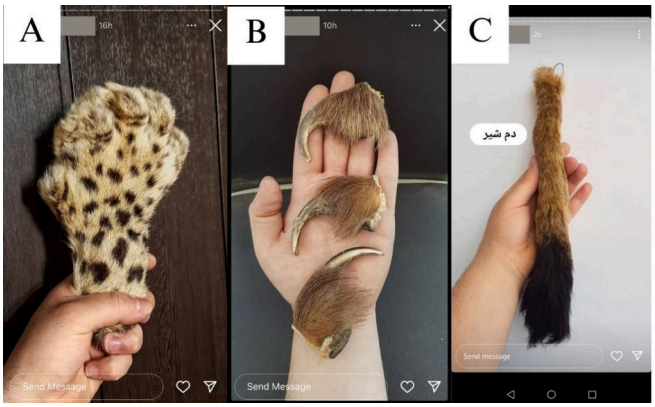


Fig. 2. Examples of carnivore body parts advertised for sale on Instagram stories. These images depict body parts from wild carnivores being sold online, reflecting the commodification and normalization of illegal wildlife products. Items include A) a leopard paw, B) brown bear claws, and C) a lion tail. All images were screenshots of publicly accessible content, collected for academic analysis and research purposes. Usage complies with the principles of fair use and fair dealing. Identifiable information was removed or minimized to protect privacy. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Near Threatened (e.g., Striped Hyaena (*Hyaena hyaena*), and 8.3 % as Vulnerable (e.g., Leopard). Regionally, 50.0 % were classified as Least Concern (e.g., Golden Jackal, Beech Marten), 16.7 % as Endangered (e.g., Leopard, Brown Bear), and 33.3 % as Near Threatened (e.g., Gray Wolf, Caracal). Globally, 58.3 % of species had stable populations (e.g., Gray Wolf, Red Fox), 25.0 % showed decreasing trends (e.g., Jungle Cat (*Felis chaus*), Leopard), 8.3 % showed increasing trends (e.g., Golden Jackal), and 8.3 % had unknown trends (e.g., Caracal). Regarding CITES listings, 16.7 % were under Appendix I (e.g., Leopard), 33.3 % under Appendix II (e.g., Gray Wolf), and 50.0 % under Appendix III (e.g., Red Fox, Golden Jackal; Fig. 3).

3.2. Overview of non-native species advertisements

Among the live non-native species, the Lion (*Panthera leo*) had the highest number of advertisements, with 89 for live animals (61.8 % of the live non-native species advertisements). This was followed by Raccoon (*Procyon lotor*), with 42 advertisements (29.2 % of the live non-native species advertisements), and Tiger (*Panthera tigris*), with 8 (5.6 % of the live non-native species advertisements). A total of 111 individual lions (27.3 % adults and 73.0 % cubs), 47 raccoons (80.9 % adults and 19.2 % cubs), and 11 tigers (9.1 % adults and 90.9 % cubs) were documented in the advertisements for live animals (Fig. 1. A and B).

Among dead non-native species, the Lion (*Panthera leo*) had the highest number of advertisements, with 10 (83.3 % of the advertisements for dead non-native species). The Lion also had the most animal parts listed for sale, with 40 parts in total, including 85.0 % nails (34 parts), 7.5 % teeth (3 parts), 5.0 % tail taxidermies (2 parts), and 2.5 % skulls (1 part) (Fig. 2. C). This was followed by the Serval Cat (*Leptailurus serval*), with 2 pelts listed for sale (Fig. 1. C).

Globally, 50.0 % of non-native species advertised were listed as Least Concern (e.g., Serval Cat, Raccoon), 16.7 % as Near Threatened (e.g., Jaguar (*Panthera onaca*)), 16.7 % as Vulnerable (e.g., Lion), and 16.7 % as Endangered (e.g., Tiger). In terms of global population trends, 33.3 % of non-native species had stable populations (e.g., Serval Cat), 50.0 % showed a decreasing trend (e.g., Lion, Jaguar), and 16.7 % had increasing trends (e.g., Raccoon). Regarding CITES listings, 33.4 % were under Appendix I (e.g., Jaguar, Tiger), 33.3 % under Appendix II (e.g., Serval Cat, Lion), and 33.3 % were not listed under any CITES appendix (e.g., Raccoon, Meerkat (*Suricata suricatta*); Fig. 3).

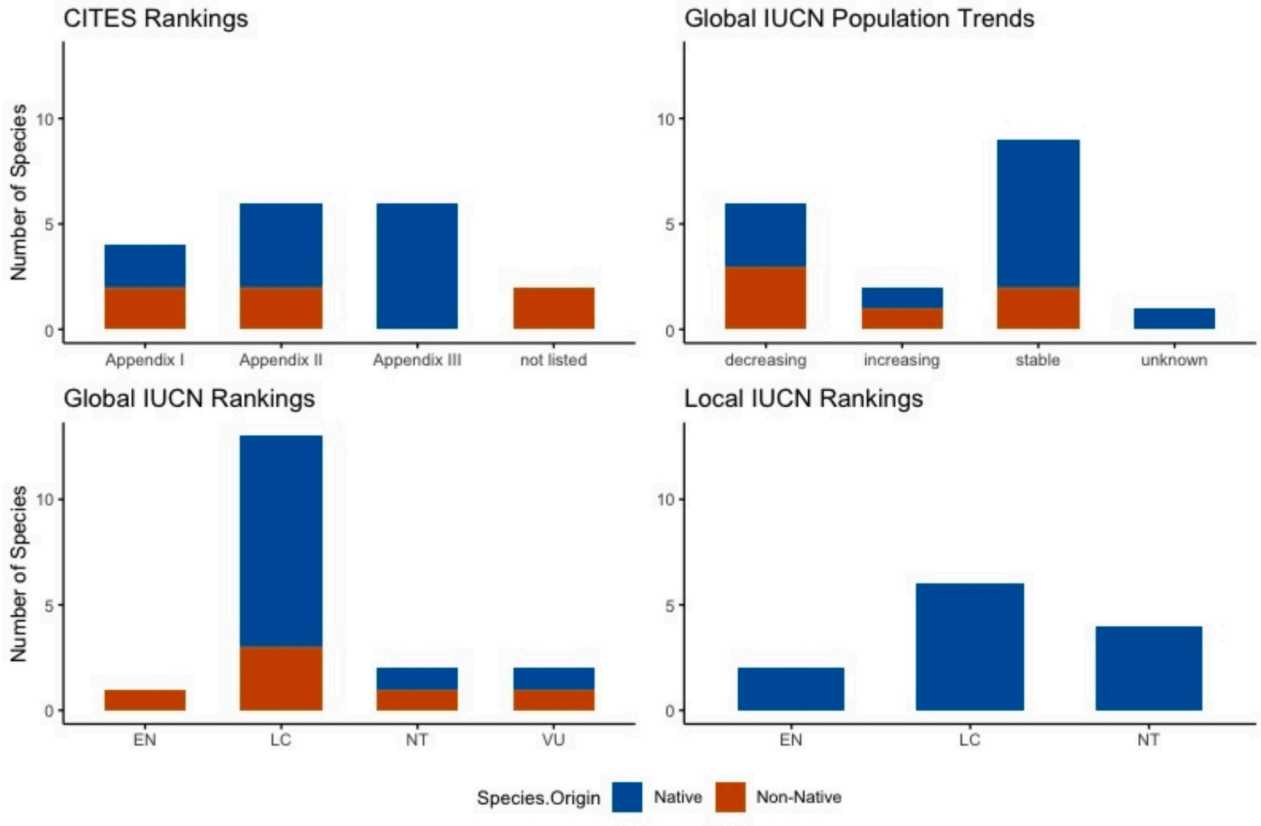


Fig. 3. Species global and regional IUCN, CITES, and global IUCN population trend rank.

3.3. Seasonal pattern of advertisements

For native species, there was a significant effect of season on log-transformed advertisement counts (F (3,8) = 13.11, P = 0.002), explaining a large portion of the variance (η^2 = 0.83; 95 % CI [0.50, 1.00]). Post-hoc tests revealed that advertisement counts in spring (e.g., April: 38 ads, May: 19 ads) and summer (e.g., June: 24 ads) were significantly higher than in fall (P = 0.008 and P = 0.025, respectively) (see Table S3). Additionally, winter counts were significantly lower than both spring (P = 0.004) and summer (P = 0.013). However, no significant differences were detected between winter and fall (P = 0.968) or between spring and summer (P = 0.812). For non-native species, most advertisements were concentrated in July (n = 32), closely followed by September (n = 30), and August (n = 24); however, no significant seasonal effect was observed overall ($F_{3,8}$ = 0.84, P = 0.509, with a small effect size (η^2 = 0.24; 95 % CI [0.00, 1.00]). Additionally, seasonal comparisons of advertisement count between native and non-native species revealed no significant differences (all P-values >0.05; Fig. 4).

3.4. Advertisement caption and image analysis

Across both live and dead animal advertisements, a thematic analysis of Instagram captions and visuals revealed four key patterns: 1) commodification of wildlife, 2) normalization of captivity, 3) status signalling and performative Luxury, and 4) controlled access (Table 2 and Fig. 5).

One of the themes for both live and dead animal postings was the commodification of wildlife, which accounted for 15.2 % (n = 44) of the entire dataset. Animals were described in purely transactional terms, with sellers emphasizing price, urgency, and scarcity. From the total postings, 12.6 % (n = 37) of all posts indicated that animals were "available now," encouraging immediate engagement. Only 1.7 % (n = 5) of live animal ads mentioned limited stock, and 0.9 % (n = 2) of all posts stated that they take pre-orders or offer the best price. Yet, biological information and species information were largely absent. Only 2.6 % (n = 6) of live animal advertisement sellers mentioned the animal's age or sex.

Another theme that emerged from the live animal data was the normalization of captivity, which was conveyed through both language and imagery. In 5.4 % (n = 12) of the posts, sellers highlighted that the animals were hand-raised or fed by hand (bottle-fed), and in 4.5 % (n = 10) of the posts, sellers described the animals as tame and suitable for captivity (Fig. 5. A). Visually, 11.7 % (n = 26) of live ads featured animals in cages, 21.9 % (n = 49) in hands or being touched, and 8.6 % (n =

Table 2
Thematic summary of Instagram captions selling carnivores.

Theme name	Definition	Example quote
Commodification of wildlife	Animals are marketed as commodities, with sellers emphasizing price, rarity, and limited availability to create urgency and exclusivity, while omitting biological details to enhance perceived value and justify secrecy.	"Raccoon, 10 million. [Iranian currency ~ USD 108]"/ "Gentlemen, get your money ready. Very limited this year."/ "Only a few left, act fast." / "Limited quantity"/ "Price is the best you'll find."/ "Very reasonable price."
Normalization of captivity	Captivity is portrayed as normal and acceptable, with animals shown in cages or on leashes and described as tame or hand-fed.	"Tame fox cub available, hand-raised."/ She eats from hand."
Status signalling and performative luxury	Owning wild animals is used to project masculinity, wealth, and social status, particularly through association with luxury settings. Project masculinity, in our context is the display of strength, dominance, and social prestige, often tied to male identity in Iran's urban elite.	"Location: Lavasan [a wealthy Tehran suburb]." "You pay 20 million [Iranian currency ~ USD 216] for a Pomeranian that looks like a fox… why not get the real thing?"
Controlled access	Sellers deliberately restrict public communication by diverting interested buyers to private channels like Instagram DMs or WhatsApp. This practice serves as a gatekeeping mechanism, reinforcing exclusivity and reducing public traceability.	"Direct message only."/ "Send DM for more details."/ "Number in bio, don't comment here."

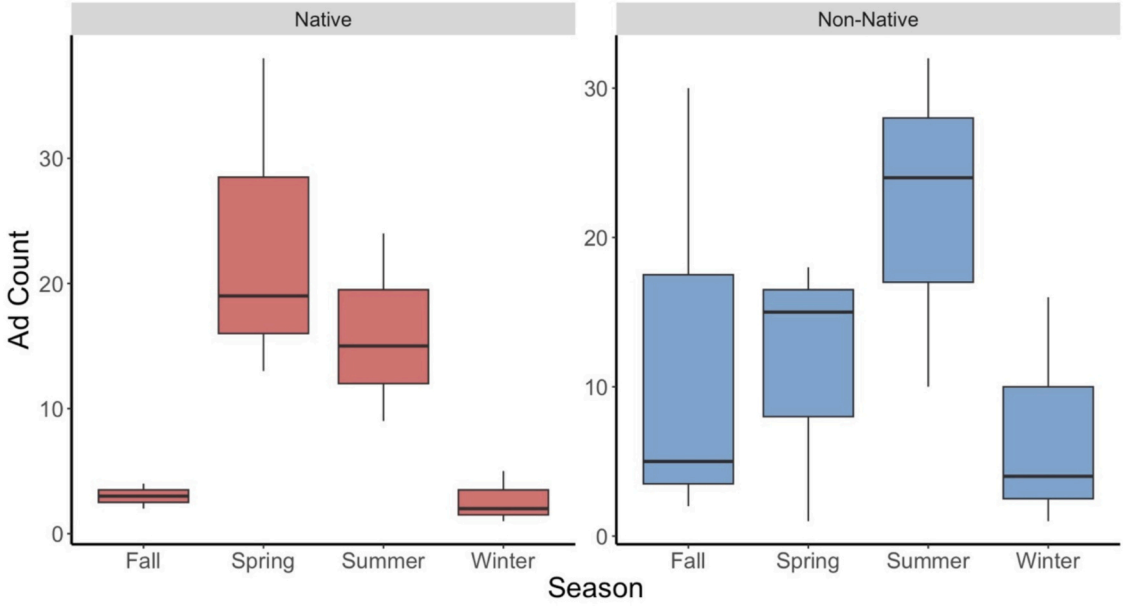


Fig. 4. Temporal pattern of advertisements across different seasons of the year for live native and non-native carnivores advertised on Instagram for sale. The central line indicates the median, the box edges represent the interquartile range (IQR), and whiskers denote 1.5 times the IQR.



Fig. 5. Examples of live wild animals advertised for sale on Instagram stories. The images show a variety of wild carnivores, including a fox, beech marten, and lion cubs, being marketed as pets. Captions in Persian highlight the animals' tameness, beauty, and exclusivity, while also providing informal sales pitches and contact information. Translations of the text in the stories are as follows (left to right): A) "fox pup, hand-raised, available" B) "You're giving 20 million[Iranian currency ~ USD 216] for a Pomeranian, this one looks like a fox A smart person knows why you shouldn't miss this" C) "Raccoon pup, incredibly beautiful; only calls, I'm at your service friends" D) "Available – WhatsApp" E) "We don't do shipping/ Location: Lavasan – two loves". These ads reflect the commodification of wildlife, portraying wild animals as desirable and luxurious pets, often omitting legal or welfare concerns. All images were screenshots of publicly accessible content, collected for academic analysis and research purposes. Usage complies with the principles of fair use and fair dealing. Identifiable information was removed or minimized to protect privacy.

19) showed them with collars (Fig. 5). The remaining posts (57.8 %) either lacked a photo or featured an image of the animal in the wild, sourced from the internet.

The themes of status signalling and performative luxury emerged in posts that associated wild animals with wealth, exclusivity, or masculinity. We used masculinity to denote a cluster of cues linking wildlife ownership to male-coded ideals of strength, control, and purchasing power. This was conveyed both linguistically (e.g., direct address to "gentlemen") and contextually, by pairing offers with affluent locales such as Lavasan and luxury cars. In 2.2 % (n = 5) of live animal posts, the animals were shown inside or beside luxury cars. While only 2.3 % (n = 7) of all posts explicitly referenced luxury lifestyles and 0.6 % included motivational quotes, these messages often accompanied images of animals in upscale environments or compared wildlife pets to high-end dog breeds. For example, one caption read, "You pay 20 million [Iranian currency ~ USD 216] for a Pomeranian that looks like a fox, why not get the real thing?" such messaging positions wildlife ownership as a form of social distinction (Fig. 5. B). The last theme that emerged from the data was controlled access; in 7.5 % (n = 22) of all posts, sellers instructed buyers to initiate private contact via WhatsApp or Instagram direct messages (DMs), and in 2.3 % (n = 7) of the posts, they included phone numbers.

4. Discussion

Our findings illustrate the dynamics of the illegal trade of native and non-native carnivores on Instagram in Iran. The advertisements for live animals and animal parts reflect a demand for carnivores as pets or for their body parts as ornaments in Iran. For threatened species such as bears and leopards, even a small number of advertisements is of concern, given their conservation status in the country. The findings underscore the need for targeted conservation and regulatory actions, particularly given Iran's strategic geographic location, which can facilitate illegal wildlife trade across various regions (Farhadinia et al., 2019; Hinsley et al., 2019).

4.1. Conservation and CITES status of the species

The results show that most species in the trade were categorized as Least Concern by the IUCN Red List, both globally and regionally, including the Red Fox, Golden Jackal, and Beech Marten, which is similar to the situation in Morocco (Bergin and Nijman, 2016). This could suggest that these species are abundant enough to appear in the trade without facing immediate extinction risks (Sardari et al., 2022; Green et al., 2022). However, regionally classified Endangered species, including the Leopard and Brown Bear, were also detected (Yusefi et al., 2019), indicating that some threatened species are still targeted. While Least Concern species may not face immediate existential threats, unregulated trade, especially for those with declining population trends such as the Jungle Cat (*Felis chaus*), could result in local population declines over time (Morton et al., 2021; Hinsley et al., 2023). This can specifically pose a threat to Iranian populations of carnivore species, given the absence of robust population estimates and the unknown status of most of them (Yusefi et al., 2019).

The absence of highly endangered species, such as the Asiatic Cheetah or the Asiatic Black Bear, in the studied market may reflect that their trade is conducted through more covert channels rather than being absent altogether (Stringham et al., 2021). There have been reports of the Asiatic Cheetah (Jowkar et al., 2008; Farhadinia et al., 2017) and the Asiatic black bear (Sardari et al., 2024) being trafficked in Iran in the past. Yet no Cheetah or Black Bear advertisements appeared in our dataset. This absence likely reflects differences in trafficking networks; these critically endangered and high-profile species are often traded by more organized criminal groups that avoid public-facing platforms and instead use encrypted apps, in-person deals, or private contacts to minimize detection risk (Tricorache et al., 2021). In contrast, the species we documented, such as Red Fox, are more accessible and may be sourced by casual poachers or small-scale sellers who are more likely to advertise openly on social media. This suggests a stratified digital wildlife market, where the rarity of species and enforcement risk influence the visibility of trade activity across platforms.

Additionally, detecting species listed under CITES Appendices I and II, such as the Lion, Leopard, and Gray Wolf, highlights the need for stricter enforcement of international trade regulations (Bergin and Nijman, 2016; Nijman et al., 2021), especially in a country like Iran, which is situated at the intersection of major trade routes (Farhadinia et al., 2019). However, enforcement alone is not sufficient. CITES regulations often struggle to ensure sustainability without the active support and economic participation of local communities, as trade restrictions can unintentionally reduce the economic value of these species for local stakeholders, potentially driving unsustainable exploitation (Abensperg-Traun, 2009). This challenge is particularly pronounced in regions such as Iran, where weak enforcement, political instability, and high levels of corruption can undermine conservation efforts and facilitate the illegal

wildlife trade. In such contexts, bottom-up interventions, which engage communities near habitats of native species, may help fill enforcement gaps. Community-led, non-extractive approaches that generate local benefits. For example, wildlife monitoring and wildlife-based ecotourism can provide alternative sources of income that bring economic value and can potentially foster local stewardship of native wildlife (Redpath et al., 2017).

4.2. Seasonality in the trade

We found a clear seasonal pattern in advertisements for native species, with significant peaks during spring and summer compared to fall and winter. Sardari et al. (2022) observed a similar seasonal trend in the trade of Iranian wildlife on social media, noting that the increased availability of young animals in spring aligns with a peak in trading activity. A similar pattern was observed in Lebanon, where illegal hunting activity peaked in certain seasons, likely influenced by species availability and environmental conditions (Raine et al., 2025). Springtime births make young animals particularly vulnerable to capture, as they are easier to handle and transport and are often more appealing to buyers seeking wildlife as pets (Sardari et al., 2022, 2024; Thomas et al., 2021). This is also reflected in our data, where most live native species are young individuals. Equally important, weather conditions during spring and summer may be more favourable for poachers to trap or catch animals (Nijman et al., 2021). This pattern suggests illegal wildlife traders may strategically target breeding or birthing seasons and favourable environmental conditions to maximize their capture success (Hughes et al., 2023).

For non-native species, our study showed no significant seasonal pattern. This may suggest that seasonal poaching pressures may have a greater influence on native species, while non-native species are likely sourced from captive facilities or international networks that operate independently of local ecological cycles. This temporal finding aligns with research from Indonesia, where the civet trade remained stable throughout the year due to captive breeding and long-term supply chains (Nijman et al., 2024). Arias et al. (2024) highlighted how local and cultural uses often drive trade in native species, while non-native species are frequently linked to organized international networks and luxury markets. This insight suggests that Iran's non-native wildlife trade may involve organized supply chains extending beyond its borders, as exotic animals like lions and tigers are trafficked for their appeal as luxury pets, rather than being driven by the seasonal availability of wild captures (Thomas et al., 2021).

4.3. Advertisement caption and image

Our thematic analysis of captions revealed that sellers primarily emphasized captions such as "Only a few left" or "Very limited this year," which were designed to create buyer pressure and boost demand, and rarely emphasized details such as the animal's age or sex. When present, these details may have been included simply to inform potential buyers or to cater to specific preferences (e.g., a preference for a certain sex or age class) and instead focused more on characteristics like tameness or luxury to attract buyers. Visual cues, such as animals in hands, cages, or with collars, may function to reassure potential buyers that the animals are suitable as pets. Such imagery and descriptions reinforce that these wild species are docile and suitable for private ownership. Meanwhile, aspirational content referencing luxury lifestyles and motivational themes positioned exotic animals as symbols of status and identity. This mirrors findings by De La Torre et al. (2025), who documented that online advertisements for jaguars and other felids in Mexico frequently emphasized luxury, status symbolism, and tameness through staged images and aspirational language to attract buyers. In the Iranian context, such culturally resonant values may include gendered ideals in which ownership of rare or powerful wildlife is associated with male identity, strength, and social authority. This marketing approach reflects broader trends in illegal wildlife trade, where animals are portrayed as lifestyle accessories to appeal to specific market segments, often by aligning symbolic meanings with culturally resonant values (Song et al., 2017). This aligns with findings from Nijman et al. (2024), who documented similar marketing strategies in Indonesia's wildlife trade, where civets were advertised using aspirational and status-driven language rather than factual biological details. Additionally, Nijman and Nekaris (2014) highlighted the role of cultural norms in shaping the perception and marketing of wildlife, emphasizing how exotic animals are often valued for their symbolic association with status and identity.

Additionally, the observed thematic patterns in the advertisements align with the principles of the Motivation, Opportunity, Ability (MOA) model (Gruen et al., 2005) and the Consumer Engagement Behavior (CEB) model (Brodie et al., 2013). These models show how sellers employ tactics such as urgency, exclusivity, and culturally resonant language to boost consumer motivation, mitigate purchase barriers, and enhance the perceived value of exotic pets (Feddema et al., 2020). For instance, captions like "Only a few left" or "Very limited this year" are designed to evoke a sense of urgency, scarcity, and exclusivity. At the same time, status-oriented messages like "You pay 20 million [Iranian currency ~ USD 216] for a Pomeranian that looks like a fox, why not get the real thing?" reinforce social signalling. Such language taps into the psychological drivers that make consumers more likely to engage with these posts, reflecting a strategic use of MOA and CEB principles to increase consumer engagement (Feddema et al., 2020).

4.4. Conservation implications and recommendations

On the supply side, interventions aimed at sellers can help reduce the flow of wild animals into trade. These measures can include consistent enforcement of existing wildlife laws, as well as platform-level monitoring to remove illegal wildlife listings, particularly during peak trade seasons. Where feasible, community-based monitoring and reporting systems can also deter poaching by increasing the number of detections.

Given that supply and demand are interlinked and changes in availability can influence purchasing behavior, especially when combined with targeted awareness campaigns and enforcement measures (Natali, 2024; Convention on International Trade in Endangered Species of Wild Fauna and Flora, n.d.). Therefore, considering consumers as "agents of change" in reducing illegal wildlife trade must not be overlooked. Recognizing this, CITES has encouraged conservation practitioners and organizations to implement educational campaigns and outreach efforts focused on demand reduction (Natali, 2024).

Demand reduction efforts targeting consumers could include public awareness campaigns on social media platforms that explicitly address the legal risks, welfare concerns, and conservation impacts of buying wildlife, as well as culturally tailored messaging to shift social norms away from using wild animals as status symbols, particularly given our finding that sellers often market carnivores as emblems of luxury living and elevated social status. For instance, the prevalence of species like lions and tigers, which are marketed as luxury pets, highlights the role of social status in driving demand. Culturally tailored outreach campaigns, such as those in China, could help shift attitudes and reduce the use of wildlife as a status symbol (Carter, 2017; Morcatty et al., 2024).

In the Iranian context, conservation marketing campaigns could leverage the aesthetics and aspirational themes evident in the social media posts we examined, such as presenting animals as symbols of status or suitability for pets, but redirect them toward more ethical and locally feasible alternatives. For instance, campaigns could emphasize culturally resonant values, such as compassion toward animals rooted in Persian literature, to build social prestige around wildlife protection rather than ownership. Partnering with local social media influencers, particularly those already active in lifestyle or nature niches, may help normalize these attitudes and shift consumer preferences away from owning live animals.

Addressing both ends of the trade chain ensures that conservation measures simultaneously reduce incentives to poach and weaken market interest in illegal wildlife products. Demand reduction campaigns, which can be posted on social media platforms, and monitoring efforts can be targeted at seasons when trade occurs most frequently to reduce poaching and demand for wild-caught animals (Sardari et al., 2022; Thomas et al., 2021). Given Iran's limited enforcement resources, focusing on key periods for native species advertisements (spring and summer) could maximize conservation impact.

5. Limitations and future directions

This study has two main limitations. First, we relied on public Instagram posts, which means that private, encrypted, or invite-only trade channels, often critical components of illegal wildlife markets, were not captured, potentially underestimating the accurate scale of carnivore trafficking in Iran. Second, species identification and age classification relied on online images and descriptions, which can introduce errors due to misidentification. This limitation is particularly relevant for morphologically similar species, such as lions, tigers, foxes, and wolves, especially when trying to identify animal parts. Efforts were made to verify species identity using available images, but this approach remains inherently less accurate than direct observation or genetic confirmation.

In the current study, we examined how sellers market the animals, which not only informs consumer-focused interventions but also reveals opportunities to address the seller side of the trade. Future research should focus on identifying specific target audiences and understanding the motivations behind both consuming and selling wildlife products. In this context, employing a "system-mapping process" proves especially valuable, as it helps pinpoint the most appropriate interventions for each group (Thomas-Walters et al., 2020). Moreover, future studies should prioritize multilingual approaches, such as Persian and Arabic, to capture a more comprehensive picture of wildlife trade in the region. Additionally, to develop a more thorough understanding of illegal wildlife trade in the region, future studies should investigate trade dynamics in neighbouring countries, such as Iraq, Afghanistan, and Pakistan. These areas may play key roles in regional trafficking networks as source, transit, or destination points for illegally traded species.

6. Conclusion

In conclusion, the seasonal trends identified in this study provide actionable insights for optimizing enforcement efforts against illegal wildlife trade in Iran. By focusing resources during high-risk seasons and adapting monitoring to the digital landscape, Iranian authorities can take significant strides toward reducing the illegal trade of vulnerable carnivores. This targeted approach, combined with efforts to understand and address how carnivores are being marketed for both native and non-native species, offers a strategic pathway for enhancing Iran's conservation efforts in an increasingly digitalized trade environment.

CRediT authorship contribution statement

Pourya Sardari: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Nima Badelu:** Writing – review & editing, Formal analysis, Data curation, Conceptualization. **Pardis Rajabipour:** Data curation. **Alireza Mohammadi:** Writing – review & editing, Supervision, Resources. **David L. Roberts:** Writing – review & editing, Supervision. **Gerard Kyle:** Writing – review & editing, Supervision. **Mohammad S. Farhadinia:** Writing – review & editing, Supervision, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

Grammarly AI assistant was used to enhance the readability and language of this manuscript under human supervision. No generative intelligence or AI-assisted technologies were used to generate content, ideas, or theories. After using Grammarly, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.biocon.2025.111521.

Data availability

Data will be made available on request.

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