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DEER SPECIALIST GROUP NEWS

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Editorial

Dear DSG members,

We are glad to present to you the latest issue of the IUCN SSC Deer SG newsletter. This issue includes some very interesting articles, some regard lesser known species, such as the Chinese water deer that are affected by feral dogs, or a report about a new population of the Visayan spotted deer, while others discuss methods for capturing and marking of young red deer fawns, the efforts to conserve the Taruka, and even a valuable comment article by Dr. John Jackson questioning the categorization of endangered deer.

We would also like to take this opportunity to call for volunteers who would like to contribute to the following topics or thematic working groups that are crucial for many endangered, vulnerable and data-deficient deer species. We would be grateful if you would contribute your expertise to the joint efforts to advance our knowledge and produce relevant protocols and/or action plans.

- Climate Change Working Group
- Collect data on the currently known effects, and other possible ones, of global warming on cold-climate DSG species.
- Create protocols to mitigate human-deer conflict in general, and, more specifically in various South American habitats and regions, such as the Pampas, Cerrado, open grasslands, as well as in several forested regions.

We invite all of you to contact us, share your expertise and work together towards those targets. Noam is leading the Climate Change Working Group Network and Susana the work on the protocols to mitigate human-deer conflict.

We are now open for registration for the Training Workshop on Neotropical Deer in Uruguay. The objective is to attract new field deer biologists and conservationists. The workshop will be in a hybrid format.

Lastly, we want to thank all those who contributed to this edition of the newsletter and invite all of you to submit manuscripts for the next issue by sending them to Dr. Patricia Black (black.patricia@gmail.com).

Our best wishes,

Susana and Noam

Susana González and Noam Werner,
Co-Chairs, IUCN/SSC Deer Specialist Group.

Free-ranging dogs threaten reintroduced Chinese water deer

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Abstract: Chinese water deer (*Hydropotes inermis*), a globally threatened member of the deer family, has been reintroduced to Shanghai, China, for the building of its population and biodiversity. Amid urbanization, free-ranging dogs (*Canis familiaris*), recognized as successful global invaders, encroach upon their living space. During recent reintroduction efforts, 12 Chinese water deer were released in Laogang, followed by 20 in Nanhui, without human intervention. GPS collars and camera traps were used to explore the correlation between Chinese water deer and free-ranging dogs in Laogang and Nanhui. Within 60 days post-release, all deer in the Laogang region perished. During the COVID-19 pandemic, the increasing dog population gradually shifted towards hunting the surviving deer in a group, despite the deer' exhibiting temporal avoidance. Recognizing domestic dogs as a significant anthropogenic threat to wildlife is of urgent importance. Simultaneously, it is imperative not only to educate pet owners on responsible pet ownership and promote neutering of dogs, but also to supplement these efforts with relevant laws and lethal measures.

Keywords: *Hydropotes inermis***,** Free-ranging dog, Survival rate

Resumen: El ciervo acuático chino (*Hydropotes inermis*), considerado el miembro más primitivo de la familia de los ciervos, ha sido reintroducido en Shanghái, China, con el fin de proteger la población y la biodiversidad. Sin embargo, frente a la urbanización y la creciente presencia de perros callejeros (*Canis familiaris*), reconocidos como invasores globales exitosos, su espacio vital se ve gradualmente invadido. En recientes esfuerzos de reintroducción, se liberaron 12 ciervos chinos de agua en Laogang, seguidos por 20 en Nanhui, sin intervención humana. Utilizando collares GPS y cámaras trampa, nuestro estudio tuvo como objetivo explorar la relación mutua entre el ciervo acuático chino y los perros callejeros en Laogang y Nanhui. En los primeros 60 días después de la liberación, todos los ciervos en la región de

Laogang perecieron. Es importante destacar que, durante la pandemia de COVID-19, la creciente población de perros se orientó hacia la caza de los ciervos supervivientes en grupo, a pesar de que los ciervos mostraban evitación temporal. Reconocer a los perros domésticos como una perturbación humana significativa es de suma importancia. Al mismo tiempo, es imperativo no solo educar a los dueños de mascotas sobre la tenencia responsable de animales, promover la esterilización de los perros, sino también complementar estos esfuerzos con leyes pertinentes y, si es necesario, medidas letales.

Palabras clave: *Hydropotes inermis*, perros asilvestrados, tasa de supervivencia

Introduction

Global biodiversity loss is currently exceeding the advancements made by humanity in tracking and monitoring the intra- and inter-species interactions, along with associated ecosystem changes, at an unprecedented pace in human history (Dirzo et al. 2014). The ongoing trend of climate change has rightly drawn widespread attention (Pecl et al. 2017, Malhi et al. 2020). Anthropogenically induced changes, specifically pollution, changes in land/sea use, direct exploitation of natural resources, and invasive alien species, pose additional substantial threats to wildlife (Sala et al. 2000, Maxwell et al. 2016). Land expansion driven by development eradicates once-dominant natural ecosystems, leading to widespread habitat fragmentation and isolation (Li et al. 2022). Urbanization, typically exacerbated by pollution and invasive alien species, further squeezes the living space of wildlife (Garcia-Fernandez et al. 2005, Pyšek et al. 2020).

As human activities extend globally, domestic species, along with others kept as pets or closely associated with people, have been introduced to continents and numerous islands worldwide (Wandeler et al. 1993, Long 2003, Ottoni et al. 2017). However, these animals may become free-ranging species with access to the outdoor environment after partial or complete abandonment by owners (Vanak & Gompper 2009). This, in turn, exacerbates ecological issues caused by cosmopolitan distribution (Feldmann 1974, Young et al. 2011, Simberloff 2013). For example, free-ranging dogs (*Canis familiaris*), owing to their diverse diet, can significantly impact wildlife through predation (Ritchie et al. 2013), competition (Vanak & Gompper 2009), and disturbance (Feldmann 1974, Zapata-Ríos & Branch 2016, Weng et al. 2022). Today, free-ranging species have evolved into successful global invaders (Fantle-Lepczyk et al. 2022). Interestingly, globally, 188 species have been identified as threatened by free-ranging dogs (Doherty et al. 2017), potentially leading to local extinctions (Borroto-Páez 2009). As former human assistants (e.g., facilitate hunting, or protect property), dogs receive less attention, despite being potential predators of, disturbers of, or competitors with a wider variety of native species, than others (Feldmann 1974, Contreras-Abarca et al. 2022). During the COVID-19 Pandemic, the population of free-ranging dogs in urban areas increased steadily (Lan et al. 2021, Carroll et al. 2023). Clustered dogs are the most abundant carnivore, which have spread to the outskirts of cities, significantly disrupting urban ecosystems. This poses a particular threat to recently reintroduced deer.

The Chinese water deer (*Hydropotes inermis*, Fig. 1), the most primitive deer in the family Cervidae, is typically found in waterside habitats (e.g., reeds, intertidal zones, or riverbank slopes; Sheng 1992). The rapid process of urbanization has led to a shrinking population size of Chinese water deer, resulting in a fragmented distribution pattern (Sheng 1992). In this regard, Shanghai, within its historical distribution area, initiated the reintroduction project to enhance biodiversity in 2006 (Su et al. 2008, Chen et al. 2016). From 2009 to 2010, the hard release of Chinese water deer in locations such as Binjiang Forest Park and Nanhui East Shoal, as evidenced by monitoring, led to population continuity, with the population gradually adapting to the free environment (Chen et al. 2016, He et al. 2016). However, during recent reintroduction efforts in Laogang and Nanhui, Shanghai, where Chinese water deer are adapting to the open urbanized landscape, they also encounter a significant presence of free-ranging dogs. We hypothesize that an inverse correlation may exist between dogs and reintroduced deer in the same area.

Figure 1. Chinese water deer are staring.

Material and Methods

Laogang and Nanhui, Shanghai, both experience a Northern subtropical monsoon climate, characterized by abundant precipitation and high humidity. The study area is situated north of the Dazhi River, positioned along the coastal ecological corridor of Laogang, with a total area of 110.67 ha (Fig. 2). In 2016, Shanghai initiated the construction of a wildlife habitat in Laogang, transforming the former landfill into a surrogate natural ecological conservation park. Consequently, the key habitats within Laogang primarily consist of artificial forests and constructed wetlands, whereas Nanhui differs. The Nanhui East Shoal is located on the southern bank of the Yangtze River estuary, serving as a crucial stopover for East Asia-Australasia migratory birds. The study area is situated in the middle eastern part of the wetland, covering a total area of 161.72 ha (Fig. 2), predominantly composed of natural wetlands, complemented by planted forested areas.

On December 8, 2020, 12 Chinese water deer were released in Laogang, followed by 20 in Nanhui on January 20, 2021, where 5 deer in each release area were tracked using GPS-collars, without human intervention. Simultaneously, 10 infrared cameras were strategically placed at frequent activity sites within the study areas, with a minimum spacing of 300 meters between survey points during the same period. Data were collected and camera conditions were maintained every week throughout the monitoring period. Based on this, the Avoidance-Attraction Ratio (AAR, AAR= T_2/T_1) was utilized to assess the temporal relationships between two species, indicating a nonrandom relationship when AAR>1 (Parsons et al. 2016). We analyzed the time interval between deer detections with (T_1) and without (T_2) the presence of free-ranging dogs.

Figure 2. Map of study area where Chinese water deer were recorded. (a. A deceased deer was preyed upon by packs of dogs in Laogang; b. A surviving deer was injured and fled after being attacked by free-ranging dogs in Nanhui).

Results

During the initial phase of the hard release program (<10 days), Chinese water deer experienced a rapid decline, with mortality rates being 4/5 in Laogang and 2/5 in Nanhui. Within 60 days post-release, all deer in the Laogang region perished. Through examining injuries on carcasses (i.e., canine bite marks), and analyzing camera data capturing instances of dogs chasing and consuming deer, it was determined that the substantial mortality in Laogang was attributable to dog-related factors (Fig. 2). In Nanhui, the surviving deer were still being pursued, despite a significant temporal avoidance of them from free-ranging dogs (AAR= 15.36 ± 1.21, $p < 0.05$; Fig. 2).

Discussion

Free-ranging dogs can have negative interactions with wildlife, even in natural areas (Hughes & Macdonald 2013). For example, the local extinction of conga hutia (*Capromys pilorides*) in Cuba is largely attributed to free-ranging dogs (Borroto-Páez 2009). In addition to local extirpations, herbivores, omnivores, and even small carnivores may shift their spatial distributions or temporal patterns of activities, or both, in response to free-ranging dogs, particularly susceptible and skittish ungulates, regardless of size (e.g. wild boar, *Sus scrofa*; Reeves's muntjac, *Muntiacus reevesi*; Lacerda et al. 2009, Weng et al. 2022).

Despite a significant increase in the time interval between Chinese water deer occurrences and the presence of dogs, indicating temporal avoidance, they are still being preyed upon and disturbed, resulting in a decrease in their numbers. Once domestic dogs enter natural environments, they typically transform into indiscriminate predators (Feldmann 1974). In the past, there were few dogs in the release sites, posing no major threat. However, the growing dog population gradually shifted towards hunting wildlife in a group (Young et al. 2011). It is noteworthy that deer in both areas are pursued by packs of dogs, and dense forests become a secondary cause of mortality for deer that are both environmentally unaccustomed and distressed. In Laogang, deer that were chased by dogs and managed to escape are in a stressed state. In their haste, they may collide with hard tree trunks instead of soft reeds, leading to fractures and fatalities.

From a conservation perspective, free-ranging dogs can kill or disturb wildlife (Contreras-Abarca et al. 2022). Promoting responsible pet ownership by educating owners to reduce free-ranging and abandonment behaviors, and fostering more responsible pet care, enhances the well-being of wild animals and contributes to better safeguarding of global biodiversity. Therefore, laws promoting responsible pet ownership are undoubtedly crucial, and it is imperative to ensure effective law enforcement. Trap-Neuter-Release (TNR) is necessary as it prevents dogs from reproducing, thereby decreasing population growth rates. However, post-neutering, dogs may exhibit high activity, which could lead to increased predation on wildlife (Garde et al. 2016). Consequently, these methods may not affect the existing number of dogs, which are still potential predators and disturbers if measures involving culling are not implemented (Garde et al. 2016, Crespin et al. 2020).

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Confirmation of a population of the Visayan Spotted Deer Rusa alfredi in a forest fragment of the Southwest Negros KBA, Negros, Philippines.

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Abstract

The Visayan Spotted Deer *Rusa alfredi* (Fig. 1) is categorised as Endangered by the global IUCN Red List of Threatened Species, and as Critically Endangered in the Philippine Red List. It is endemic to the West Visayas region of the Philippines. This species has been managed in a local and international captive breeding programme since 1990, with sporadic surveys of the population across the islands of Negros and Panay. In the wild the species has continued to decline across its range; the captive population is stable or increasing. The very few wild populations known to remain are represented by few confirmed sightings or other empirical evidence. Continued habitat loss and hunting pressure render the identification and active protection of remaining population fragments urgent. The Talarak Foundation Inc. has explored the island of Negros for several years to find this species. Camera traps and belt transects were deployed in those locations with previous reliable records or suggestive (but unverified) reports of the species, where protection is judged to be most needed (based on habitat suitability, likelihood of population survival and sustainability, and areas of heightened threat). We are excited to announce the photographically confirmed discovery of a wild Visayan Spotted Deer population. The area in question has been a hotbed of poaching over the last couple of decades, and requires conservation plans. It is within an identified Key Biodiversity Area, with numerous endemic and threatened species as well as indigenous tribes, but it desperately needs protection. This evidence can be used to push for more legal conservation declarations within this KBA, allowing the deer to thrive once again.

Keywords: Conservation, Endangered, Endemic, Evidence, West Visayas

Resumen

El venado moteado de Visayan *Rusa alfredi* (Fig. 1) está clasificado como En Peligro de Extinción según la Lista Roja de Especies Amenazadas de la UICN global, y como En Peligro Crítico de Extinción en la Lista Roja de Filipinas. Es endémica de la región de Visayas Occidental de Filipinas. Esta especie ha sido gestionada en un programa de cría en cautiverio local e internacional desde 1990, con estudios esporádicos de la población en las islas de Negros y Panay. En la naturaleza, la especie ha seguido disminuyendo en toda su área de distribución; la población cautiva es estable o está aumentando. Las pocas poblaciones silvestres que se sabe que quedan están representadas por pocos avistamientos confirmados u otra evidencia empírica. La continua pérdida de hábitat y la presión de la caza hacen urgente la identificación y protección activa de los fragmentos de población restantes. La Talarak Foundation Inc. ha explorado la isla de Negros durante varios años para encontrar esta especie. Se desplegaron cámaras trampa y transectos de cinturón en aquellos lugares con registros confiables previos o informes sugerentes (pero no verificados) de la especie, donde se considera que la protección es más necesaria (basada en la idoneidad del hábitat, la probabilidad de supervivencia y sostenibilidad de la población, y las áreas de mayor vulnerabilidad). amenaza). Nos complace anunciar el descubrimiento confirmado fotográficamente de una población salvaje de ciervos manchados de Visayas. El área en cuestión ha sido un foco de caza furtiva durante las últimas dos décadas y requiere planes de conservación. Se encuentra dentro de un Área Clave para la Biodiversidad identificada, con numerosas especies endémicas y amenazadas, así como tribus indígenas, pero necesita desesperadamente protección. Esta evidencia se puede utilizar para impulsar más declaraciones de conservación legales dentro de esta KBA, lo que permitirá que los ciervos prosperen una vez más.

Palabras clave: conservación, amenazado, endémico, evidencia, Bisayas Occidentales

Introduction

The Visayan Spotted Deer *Rusa alfredi*, categorised as Endangered in the global IUCN Red List of Threatened Species (Brook 2016), and as Critically Endangered in the Philippine Red List (Biodiversity Management Bureau 2020), is endemic to the West Visayas faunal region of the Philippines, which consists of the islands of Negros, Panay, Cebu, Masbate, Ticao and Guimaras. The West Visayas faunal region is one of five primary faunal regions within the Philippine archipelago where large amounts of regional endemism can be found, including this deer, the Visayan Warty Pig Sus cebifrons, and the Visayan

Hornbill Penelopides panini. The Visayan Spotted Deer has been managed in a captive breeding programme since 1990, when the collaborative efforts of the Department of Environment and Natural Resources of the Philippines, Mulhouse Zoo, and the Silliman University Center for Tropical Studies initiated the Philippine Spotted Deer Conservation Program (Oliver et al. 1991). Since the inception of this programme, the species has been maintained in several conservation centres in the Philippines, including the Talarak Foundation-managed centres in Bacolod City and Kabankalan City, and the Silliman University Center for Tropical Studies in Dumaguete City, all on Negros Island. This species was also sent to zoological institutions internationally, with multiple zoos in Europe, including the United Kingdom, housing and breeding the species to this day, as per the Visayan Spotted Deer studbook 2023 (see Heckel & Schubert 2023). Unfortunately, in the wild the species is now restricted to only two islands, those of Negros and Panay; there are also old records from Cebu and based on zoogeographic patterns it is likely that it formerly inhabited also Masbate and Guimaras. Even within Negros and Panay it faces severe threats from habitat loss, fragmentation and illegal hunting (Posadas 2018). There are extremely few credible sightings and even fewer documented pictures of this species in its remaining wild range, even after substantial surveying and community discussions. Local conservation practitioners suggest that this species would more aptly be categorised on the global IUCN Red List of Threatened Species not as Endangered but as Critically Endangered (M. Ward pers. comm. 2023): unconfirmed conversational reports from local communities, conservation NGOs and former hunters indicate that there are now only a few remnant populations left on Negros and Panay islands.

One suspected remaining population inhabits the unprotected Southwest Negros Key Biodiversity Area (KBA), within the municipalities of Bayawan, Basay and Hinobaan. This might be the largest wild population of the species: poached individuals, for the food and pet markets, were reported from the area frequently over the last three decades. Some of these animals were donated or seized and brought into the captive breeding programme on Negros. Although the area remains popular with poachers it has had no confirmed evidence of the Visayan Spotted Deer for many years.

Figure 1. Visayan Spotted Deer *Rusa alfredi* male in the Bayawan Nature Reserve, Negros Island, Philippines.

Methods

The Talarak Foundation Inc. is committed to conserving and restoring this species, and as such has spent the previous two years investigating possible sightings or other claims and assessing remaining forest fragments within the previously known and documented range, for the species' presence. Assessments involved 1 km × 10 m belt transects for signs (such as faeces, footprints, and tree rubbings), habitat assessment, discussions with local community members, and camera trapping.

Transects ran along existing trails, with a minimum 500 m radial interval between transect lines. Habitat assessments were conducted every 100 m along the transect line. Three camera traps were placed during each survey period for approximately 90 days each, either on or immediately adjacent to transect lines. Camera traps were set to record videos for 30 seconds with 30 second intervals, and targeted toward trails, clearings or other likely locations of detection without being baited. The 'successful' survey used three camera traps, two within transects and one outside, positioned based on observed sign(s) of the species or suggestion from local guides that the species used the site.

These population and habitat assessments were conducted in two of the three national parks of Negros Island, and in five non-protected forest areas with both a minimum of 300 ha of forest cover per area, and community suggestions of previous Visayan Spotted Deer presence. The 'successful' survey was in an indigenous people's community, in an area known as the Damutan Valley, of Hinobaan municipality. This indigenous people's community invited Talarak to assess the site, and to help protect the remaining habitat and wildlife species threatened by outside infrastructure development and poaching. The community was aware of the Talarak's mission and activities through links with government environment offices and personal connections with some of the Talarak staff.

Results

After more than 40 assessment periods across seven survey areas, involving about 2500 camera trapping days, failed to find the species on Negros, the Talarak Foundation verified footprints, faecal pellets, and camera trap images of the Visayan Spotted Deer in the Southwest Negros KBA in 2022. No other deer or other potential confusion species inhabit the region, simplifying identification of signs as from this species. The Damutan Valley has approximately 500 ha of lowland primary dipterocarp forest in mosaic with more than 1000 ha of undulating natural grasslands and fernlands that the local tribes harvest for food and fuel.

After receiving unconfirmed claims of Visayan Spotted Deer presence, the Foundation conducted three expeditions to assess the biodiversity and assess the claims of the deer's presence. The assessment team was ecstatic to see footprints and faeces of the deer early in the surveys, along with signs of tree rubbing and foraging in the forest's foliage. Operating three camera-trap stations for a combined duration of 224 camera-trap-days between 8 September and 25 December 2022, the team were delighted to obtain images of two adult individuals (suspected females), foraging on recently cut grass at 04h on a rainy night (Fig. 2).

Figure 2. Visayan Spotted Deer *Rusa alfredi*, presumed female, in the Damutan valley, Hinobaan, NegrosIsland, Philippines.

Discussion

This video gives hope that there are populations of the highly threatened Visayan Spotted Deer which can still be preserved, but it also highlights the plight of this unprotected KBA, which is also known to have a plethora of Endangered and Critically Endangered endemic species within it (M. Ward pers. comm. 2023). With renewed confidence of the species' presence, the Talarak Foundation, partner organisations, local governments and community stakeholders can work towards conservation of this deer population and indeed all of the habitats and species within this important area. Future plans for increasing conservation knowledge include increasing camera-trap efforts, to measure and monitor the deer population and demography within the Damutan valley, using the ability to track individuals on camera through their unique spot patterns (Ward et al. 2021). But this site could also provide a vital opportunity to study the natural ecology and life history of this species, at a time where the majority of data on these topics are from captive or captive-translocated individuals within the Bayawan Nature Reserve (also managed by the Talarak Foundation). Having a wild population of Visayan Spotted Deer can provide much needed data to facilitate the successful reintroduction of the species across its historic range, provide base data for husbandry improvements for the breeding programme, and support the necessary regenerative activities to restore habitats in places where they are necessary to recreate the former forested habitats of the region.

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Touching Bambi: experiences from the field for locating, capturing, handling and tagging free-ranging juvenile red deer (*Cervus elaphus*)

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Abstract

Modern wildlife research often requires the successful capture of animals, for instance for attaching telemetry devices. A variety of methods to capture ungulates have been established but may differ greatly in success and efficiency between sites and study species. We caught and tagged 52 red deer (*Cervus elaphus*) calves to gain knowledge about mortality within their first year of life in southern Germany. Calves were tagged with Very High Frequency-ear tags in four consecutive years. We used two different

methods of detection and two different methods of capture: 1) in 2020, stationary search with thermal image cameras, from the ground and from high seats for locating the calves, and a round cast net for the capture itself; 2) from 2021-2023, mobile search on foot and a mobile fencing system. In our study area, active search on foot in combination with a mobile fence proved most successful as this combination is locally highly flexible and can be used by small teams of 2-3 persons, allowing several teams to search for calves in different locations at the same time.
Keywords: Telemetry, capture, restraint, calves, newborn ungulates, wildlife management

Resumen

La investigación moderna sobre la vida silvestre a menudo requiere la captura exitosa de animales, por ejemplo, para colocar dispositivos de telemetría. Se han establecido una variedad de métodos para capturar ungulados, pero pueden diferir significativamente en cuanto a éxito y eficiencia según el lugar y las especies de estudio. Con el fin de obtener información sobre la mortalidad de los ciervos juveniles (*Cervus elaphus*) durante su primer año de vida en el sur de Alemania, capturamos y etiquetamos crías de ciervo con marcas en las orejas VHF durante cuatro años consecutivos. Se utilizaron dos métodos diferentes de detección: i) búsqueda estacionaria con cámaras termográficas desde el suelo y desde asientos altos y ii) búsqueda móvil a pie, así como dos métodos de captura con i) atarraya y ii) cerca móvil. En este estudio, describimos y evaluamos estos métodos de detección y captura utilizando ejemplo al ciervo juvenil. En nuestra zona de estudio, la búsqueda activa a pie en combinación con una valla móvil resultó ser la más exitosa. Sugerimos que esos métodos sean adaptables para recién nacidos de otras especies de ungulados.
Palabras clave: Telemetría, captura, sujeción, crías, ungulados recién nacidos, manejo de vida silvestre

Introduction

The capture of wild ungulates without chemical immobilization is a key aspect in many research and wildlife management projects. Therefore, a variety of methods have been established over time (Schemnitz et al. 2009) to enable sampling within health monitoring (Miller et al. 2013) or disease control programmes (Abbott et al. 1999), to track motion range and behavior of animals (Bryan 1980) or to control predation (Chitwood et al. 2015) and mortality rates (Nelson & Woolf 1987). For the capture of deer, several methods have been developed and used in the field (Table 1).

Despite high success rates, most of these methods are associated with high costs regarding equipment and working hours. In addition to limitations regarding costs, the applicability of certain methods may vary greatly among different types of landscapes. Net gunning from a helicopter for instance does not seem practical for forest-dwelling species. Thus, the spectrum of methods appropriate for certain types of landscapes may be greatly reduced. Further methodological challenges arise if the targeted age group are juveniles or neonates. Their cryptic colouration and behaviour make them difficult to spot (Lent 1974, Bongi et al. 2008, Pitman et al. 2014). Furthermore, calf agility and mobility already increase a few days postpartum, so that the time slot in which capturing is possible without sophisticated equipment is very limited (usually up to 10 days after birth, Cook et al. 1971). Therefore, efficient capture strategies are fundamental to run projects successfully and economically, especially because most projects and their financing are limited to a few years. Several methods have been used to locate and capture new-born deer, e.g., with the use of vaginal-implant transmitters, thermal-imaging technology, searching from an elevated position during horse-back riding or observations of nursing females (Huegel et al. 1985, Carstensen et al. 2003, Ditchkoff et al. 2005).

Here we would like to share our experiences in the field with each of two methods for locating and capturing new-born red deer (*Cervus elaphus*) in a semi-open landscape, from 2020 to 2023, as a retrospective, so others can benefit from our lessons learned in the field.

Method	Short Description	Required number of people	Reference
Drop nets	A large net is spanned above the ground at the required height above animals and linked with a trigger mechanism, which can be activated by a remote control or rope from a distance.	3-4	Ramsey 1968, Conner et al. 1987, White & Bartmann 1994, Kock et al. 1987
Rocket-/ Cannon-nets	Nets are fired with cannons or rockets over the animals.	3-4	Grieb & Sheldon 1956, Hawkins et al. 1968, Beringer et al. 1996
Drift-/Drive - nets	Portable nets are placed along trails or placed along roads. Animals will be chased into the nets.	3-5	Silvy et al. 1975, Peterson et al. 2003, Locke et al. 2004
Net guns	Nets are fired from a launcher or gun with compressed CO_2.	3	Barret et al. 1982, Potvin & Breton 1988, Webb et al. 2008
Vaginal implant transmitters (VITs)	VITs are radio transmitters, which are inserted in the vaginal tract of the gravid female (no surgery needed). Once the VIT is expelled at the birth site, it starts sending a signal, which enables location of the calf.	Not specified	Carstensen et al. 2003
Thermal imaging	Thermal infrared cameras (e.g. attached to a drone) are used to detect thermal signatures of animals.	2-3	Ditchkoff et al. 2005

Materials and Methods

Study site

The capture took place at the Grafenwöhr military training area in Bavaria, Southern Germany. The area is located at an altitude of 450 to 500 m above sea level in the Upper Palatine–Upper Main Hills at the eastern border of the Franconian Jura. Long-term annual averages of temperature and precipitation

(1981–2010) are 8.3 ± 0.04 °C and 701 ± 4 mm, respectively (Riesch et al. 2018). The training area is 223 km² in size with 60 % covered by forest and 40 % covered by open land (Raab et al. 2019). Its characteristic features are semi-open landscapes with large meadows, structured by bushy areas (mainly blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus* sp.)), and small mixed forest patches with distinct edges in the centre (Figure 1), and a surrounding forest belt at the periphery. The total red deer population is estimated to be stable at approximately 7.000 individuals in summer. Several species of potential red deer calf predators occur in the training area. After the extinction of the wolf (*Canis lupus*) in Germany in the 19th century, the species has returned to Grafenwöhr training area in 2016 and is now resident. Other potential red deer calf predators found in the study area are red foxes (*Vulpes vulpes*), European badgers (*Meles meles*) and white-tailed eagles (*Haliaeetus albicilla*). The lynx (*Lynx lynx*) is not resident but has been spotted occasionally. Other local ungulate species are roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*). Due to military activities, the Grafenwöhr training area has limited accessibility for research purposes.

Figure 1: Red deer (*Cervus elaphus*) at Grafenwöhr in typical habitat during calving season.

Spotting

In 2020, we used thermal image cameras (Liemke Bussard and Pulsar Accolade) to find calves hidden in meadows and dense vegetation such as stinging nettle (*Urtica dioica*), tall grass and bushes. Additionally, we tried to spot hinds with newborn calves from high seats, normally used for hunting, placed at the edges of meadows and forest patches.

From 2021 onwards, we changed methods due to low success rates of spotting and capturing, and started actively searching on foot the bushy edge zones of small forest patches, bushes and meadows for calves. Two teams of 2-6 people walked slowly in a line spaced at 10-15 m from each other, carefully scanning the vegetation. We carried out two searches of 2-3 hours each per day, one in the morning (start approximately at 6:30 am) and one in the afternoon (start between 2:00 and 4:00 pm).

Each year we devoted 3-4 days between the last week of May and the first week of June to the capture of calves, depending on accessibility of the training area due to military activities.

Capturing

In 2020 we used a round cast-net (diameter approximately 2 m, thrown from 4-5 m distance) to catch spotted calves. From 2021 to 2023 we switched to mobile fences for domestic sheep (16 m long, 90 cm height, mesh size 13-17 cm, colour dark green) which we replaced by a longer and higher version in 2023 (25 m long, 112 cm height, mesh size 5.9-21 cm, colour dark green). The fences served as a back-up in case calves tried to flee before being caught, which happened mostly with older calves that raised their heads and observed the capture team when spotted. When rolled up, the fences could be carried by a single person, even in rough terrain and thickets.

Once a calf was located on the ground, the fence was set up in a semi-circle facing the most probable flight direction, with a few meters distance to the hiding place (Figure 2). If the calf appeared to be very young (not raising the head and relying solely on its camouflage), it was grabbed directly on the ground without placing the fence, always depending on the situation and experience of the capture team. In older calves that seemed nervous upon being detected, the spotter retreated slowly until they were out of the calf's sight to avoid a flight reaction before the fence was in place.

For the capture itself, a team member (the catcher) approached the animal from the open side of the fence semi-circle after the fence was placed. Depending on the capture team size, one or two team members stood outside the fence to catch the calf and remove it from the fence as quickly as possible in case it got tangled up in it.

Figure 2: Building the fence in a semi-circle around a red deer calf (note the calf`s ear next to an anthill in the high grass in the front).

Handling, restraint and tagging

To get a hold on the lying calf, the catcher approached slowly and quietly from the animal's rear side and tried to push it gently to the ground by placing one hand on the shoulder and one on the pelvis. In older calves, approximately from 5 days of age onwards, it was necessary to make a jump at the animal and fixate it. In this case, sometimes one person standing opposite to the catcher and visible to the calf slowly waved their arms to divert the calf's attention from the catcher. All juveniles were blindfolded with a dark-coloured fabric immediately after fixation. The head was held still with one hand closed around both jaws with the palm under the mandibles to prevent screaming while keeping the nostrils free for breathing. Depending on their age and the intensity of struggling, calves were held by one or two team members. In neonates, restraint was only necessary while placing the ear tags to make sure they were placed properly. Older calves had to be restrained by one or two people holding both fore and hind legs. The optimal way to hold a pair of legs with one hand was by placing one finger between the legs to control the pressure on the legs, thus minimizing the risk of injury. When calves were struggling, it proved useful to kneel with the animal between the legs, so that it was fixated from both sides and from above, and therefore unable to stand up. Everyone who touched the animals wore gloves to prevent transmission of human odour to the calf, thus minimizing the probability of abandonment by the mother post capture.

Captured calves were sexed and marked with red Very High Frequency (VHF)-ear tags (Wagener HF-NF Technik Telemetrieanlagen, Cologne; weight 22 g, battery life 30 months). The salient colour of ear tags was meant to increase visibility of the tags for hunters to decrease the possibility of calves being shot in their first year of life. Tags were placed in the middle-third of the ear towards the head between the cartilage strands with the transmitter facing towards the body. After tagging, calves were released immediately.

Results

Between 2020 and 2023 we caught a total of 52 calves. In 2020, we caught 3 males, 2 females and 1 unsexed (N=7) by using thermal image cameras and a cast net. From 2021-2023, by mobile search on foot and a mobile fencing system, in 2021 we caught 10 males, 7 females (N=17), in 2022, 7 males,9 females (N=16) and in 2023, 4 males, 9 females (N=13). Estimated age of the calves was between 1 hour (calf was still wet from birth) and 10 days. In the morning, most calves were found in places exposed to the morning sun but still covered by high vegetation, mostly inside or immediately next to bushy patches surrounded by tall grass (Figure 2). With increasing temperatures during the day, calves were found in denser vegetation, especially under trees or higher bushes that provided shade and shelter. Calves were often found on slopes with elevated hiding spots, likely offering a good overview over the surrounding landscape. One hill in particular turned out to be a hotspot for capture, with high coverage in bushes and grass. Its slope was exposed from north via east to south, with captures being most successful in the part facing north and east (Figure 3).

When using the mobile sheep fence, only two calves escaped by jumping over the fence, another one slipped through the 17 cm mesh at the upper part of the fence. Calves entangled in the net could be removed quickly without cutting the net and without injury.

Except for very few situations when we found two calves within 5 meters of each other, calves were not found in close proximity.

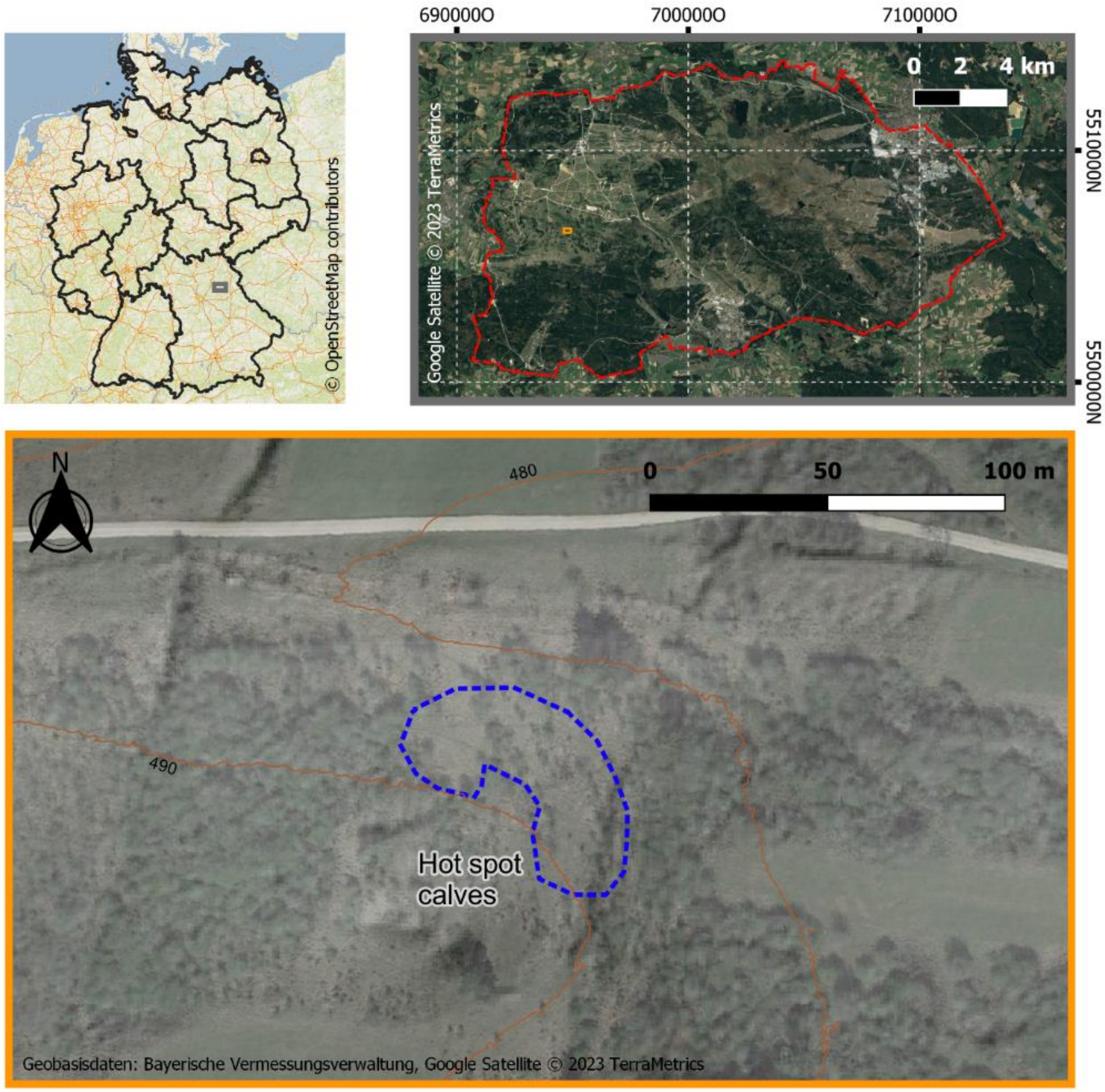

Figure 3: Location and map of the military training area Grafenwöhr in Germany (above) and the hotspot hill (blue) for the capture (below).

Discussion

Our fieldwork presented in this article was not planned as a scientific comparison of different methods. The change of methods in the second year of the capture was a result of the low number of calves caught in 2020. Unfortunately, this and the fact that publishing the capture method itself as a paper was not planned, meant that the data required for reliable analyses were not collected. For instance, we did not log the number of calves that run away before we spotted them or the ones that escaped during the capture. Our article is therefore based on the practical experiences we had during our fieldwork. Nonetheless, in our opinion our experiences can still be useful for other projects.

Spotting

The thermal cameras used in 2020 did not prove useful in the field as the grass between the camera and calves was too tall, and, from a distance, numerous anthills and European hares (*Lepus europaeus*) showed thermal signatures similar to those of red deer calves. Furthermore, objects in the field like stones or metal parts had strong thermal signatures as well, once they were exposed to the sun in the morning. This, in addition to the ant hills and hares, caused a high number of thermal signatures on the ground, making it very difficult to distinguish between red deer calves and other objects. In addition, if calves are hiding in dense vegetation (Figure 2), their heat signature cannot be seen from a greater distance from the ground. It can only be seen from a very short distance from a top view (in this case human head height) which limits the field of view, as this is reduced by the thermal camera.

The use of high seats for spotting hinds with young calves was not very successful either, as the first few days after giving birth constitute a highly sensitive time for the females and their offspring. Red deer hinds are usually very cautious, returning only 2-4 times per day to nurse their offspring (Darling 1937, as cited in Clutton-Brock & Guinness 1975), which makes observing them highly unlikely. Moreover, to nurse very young calves, female ungulates often use dense vegetation for concealment where available (Severud et al. 2019).

Searching the edge zones of meadows, bushes and forests was more effective for spotting calves than both using thermal cameras and high seats. Small teams were able to search large areas very efficiently, compared to spotting from high seats where visibility was limited to a fixed section, even in open areas.

Only a few calves were found in open meadows, possibly because the edge zones with thorny shrubs roughly at knee-height offered better protection, as predators cannot move silently through the thick vegetation (Figure 2). Additionally, attacks from aerial predators such as white-tailed eagles become more difficult. Females seem to choose areas that are not used by other females for and after parturition. Single females fleeing from bushes or forests often indicated hiding places of calves close by, whereas groups of hinds did not. This is likely due to females separating from their herd before giving birth and only re-joining when calves are able to keep up with the herd.

Drones equipped with thermal image cameras were not an option as the study area is an active military training area where the use of drones is not allowed. But this method is successfully used, for instance, in locating juvenile roe deer (*Capreolus capreolus*) (Cukor et al. 2019) and could be an option for locating juvenile red deer as well. Nonetheless, the effects of drones on wildlife in research projects are discussed (Mo & Bonatakis 2021).

Capture

The cast-net did not prove very practical as it only worked on even ground with very short and soft vegetation; in other types of landscape and vegetation, it did not lie on the ground properly and calves could slip under the net. Additionally, the net often got entangled in bushes and deadwood. Accurate casting from a distance in such habitats requires a lot of practice.

The sheep fence supported the capture well, as it worked as back up if calves tried to escape. As older and therefore faster running calves (Cook et al. 1971) had a higher flight initiation distance, the 25 m fence turned out to be better than the 16 m fence. Withthe longer fence, it was possible to place it at a greater distance from the hiding calf, reducing the disturbance to the calf and therefore the risk that the animal starts to flee before the fence was placed. In addition, the longer fence was 22cm higher compared to the 16m fence, which reduced the risk that a calf escaped by jumping over it. Depending on the experience and capability of the capture team, two to four persons were sufficient for capturing calves. If a calf escaped during the capture attempt or fled before we spotted it on the ground, it was not possible to try again to capture the same individual as, due to the bushy vegetation and / or topography, the calf was out of sight within a few seconds. In addition, a calf that fled once is much more vigilant and might not rely on its camouflage immediately again and allow humans to get as close as needed for a successful capture. Only in very young calves that were not yet able to run properly was it possible to catch up.

Handling, restraint and tagging

Most calves could be handled and restrained by one or two people. For handling calves of ungulate species larger than red deer, larger teams might be required to make the procedure safe for both humans and animals.

In some situations, the mother appeared after a calf started screaming in response to being captured or as a reaction to tagging, but all attacks were feints and the females veered without any need of intervention. Capture and handling did not seem to cause high rates of predation or abandonment as only one out of the 52 calves was found dead the next day. In this case, bite marks indicated predation by a red fox.

Conclusions

Our experiences in the field have shown that juvenile red deer can successfully be captured by active search on foot in combination with a mobile fence as used for sheep. The use of thermal image cameras from high seats for spotting and cast nets for capturing calves did not prove to be effective in our study. Small teams of two to four people actively searching certain habitat structures represent a practical method for capturing juvenile red deer. With good knowledge of the biology of the target species, the capture procedure described in this paper should be adaptable to other ungulate species, too. In species with more protective females, larger teams might be required. For smaller species, fences with smaller mesh size might be necessary. However, the method described in this study is only efficient where densities of the target species are high, calving/nursing areas are known, or where habitat structures help to reliably predict nursing sites.

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Ethical statement regarding sample collection or deer capture

The capture and tagging were carried out with permission of the responsible authorities (Regierung von Unterfranken, 11.02.2020, 55.2.2-2532.2-1092-17).

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Recent records, threats, and efforts to protect the Southernmost populations of Taruka (*Hippocamelus antisensis*) in Chile and Argentina

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Abstract

The taruka is a species that inhabits gullies and other topographically rough areas in the Central Andes Ecoregion. Due to the remoteness of this environment, locating, monitoring, and studying this deer in the field poses a significant challenge. In this study, we report updated findings of the southernmost populations of taruka in Chile and Argentina, specifically in the Huatacondo area, Tarapacá district in Chile, and Sierras del Famatina and Velasco, La Rioja Province in Argentina. We delved into the current conservation threats faced by the populations in these localities and the ongoing efforts to protect them. Taruka presence in Huatacondo was previously documented in 2005, but no new records have been reported until now. In La Rioja, official reports of taruka sightings date back 40 years. Our updated records, six sightings at Sierras del Famatina and six around mining sites in the Huatacondo area, reaffirm the continued presence of taruka in both regions. We urge the establishment of protected areas by environmental authorities to safeguard taruka habitats in these localities. Furthermore, we recommend that mining companies operating within these areas take responsibility for monitoring and preserving taruka populations within their intervention zones to ensure their survival. This is particularly crucial as these populations appear to be entirely isolated from the primary distribution range of the species.

Keywords: taruka; northern Chile; northwestern Argentina; distribution range

Resumen

La taruka es una especie que habita las quebradas y otras áreas topográficamente rugosas en la Ecorregión de los Andes Centrales. Debido a lo aislado de su ambiente, encontrar, monitorear, y estudiar a este ciervo en el campo es un gran desafío. En este estudio, reportamos avistamientos de las poblaciones más sureñas de taruka en Chile y Argentina, específicamente en el área de Huatacondo, Región de Tarapacá en Chile, y las Sierras del Famatina y de Velasco, Provincia de la Rioja en Argentina. Profundizamos en las amenazas que actualmente enfrentan estas poblaciones y los esfuerzos que se están llevando a cabo para protegerlas. En el año 2005 se registraron tarukas en Huatacondo, sin embargo, no se volvió a registrar a este ciervo en el lugar hasta este momento. En La Rioja, los últimos reportes oficiales de la presencia de la especie en la zona tienen más de 40 años de antigüedad. Los registros aquí presentados, seis en las Sierras del Famatina y seis en los alrededores de sitios de explotación minera en el área de Huatacondo, reafirman la presencia actual de la especie en ambos sectores. Recomendamos establecer áreas protegidas en el sector para conservar el hábitat de la especie. Además, recomendamos que las compañías mineras operando en el área ejecuten programas de monitoreo y protección de tarukas en sus áreas de intervención para asegurar su sobrevivencia. Ambas medidas son importantes ya que pareciera que estas poblaciones están completamente aisladas del rango de distribución principal de la especie en el continente.

Palabras clave: taruka; northern Chile; northwestern Argentina; distribution range

Introduction

The taruka (*Hippocamelus antisensis*) is a mid-sized deer that inhabits the foothills of the Central Andes Ecoregion, from northern Peru (6°44'S 78°14'W) to northwestern Argentina (29°43'S 67°40'W). Their diet preferences (Gazzolo & Barrio 2016) and digestive system morphology (Müller et al. 2013) show they are able to feed on vegetation that usually grows in gullies and other topographically rough areas that are found within this environment. Most of the research and conservation initiatives for protecting the species in South America have been conducted in a few well-known areas, such as southern Peru (Barrio

2007), the surroundings of La Paz in Bolivia (Rechberger et al. 2014), and northern Chile (Fuentes-Allende et al. 2016); the peripheral populations are underrepresented. According to IUCN, taruka is classified as “Vulnerable” throughout its whole distribution range (Barrio et al. 2017). However, at the national level the taruka is classified as “Endangered” in Argentina (Guerra & Pastore 2019), Bolivia (MMAyA 2009), and Chile (RCE 2007), and it is only “Vulnerable” in Peru (Barrio 2018).

Historical records show that taruka distribution in Chile has been reduced over time. The current known southern limit of its distribution in this country is in the vicinity of Mamiña Village (20°9’S 69°6’W; Mata et al. 2019). Nevertheless, historical records suggest that taruka was distributed up to 700 km south of this current limit (Mellet 1908; Casamiquela 1968). In relation to Argentina, the current predicted distribution range matches the historical one (29°11’S 67°50’W; Guerra & Pastore 2019). However, sightings are rare in this locality and the last record reported to science was 40 years ago (Cajal 1983).

In the present study, we report records from the southernmost populations of taruka in Chile and Argentina. These are little-known populations where there have been few research and conservation initiatives. We discuss the current threats for taruka conservation at those localities and the efforts that are being conducted to protect the species there.

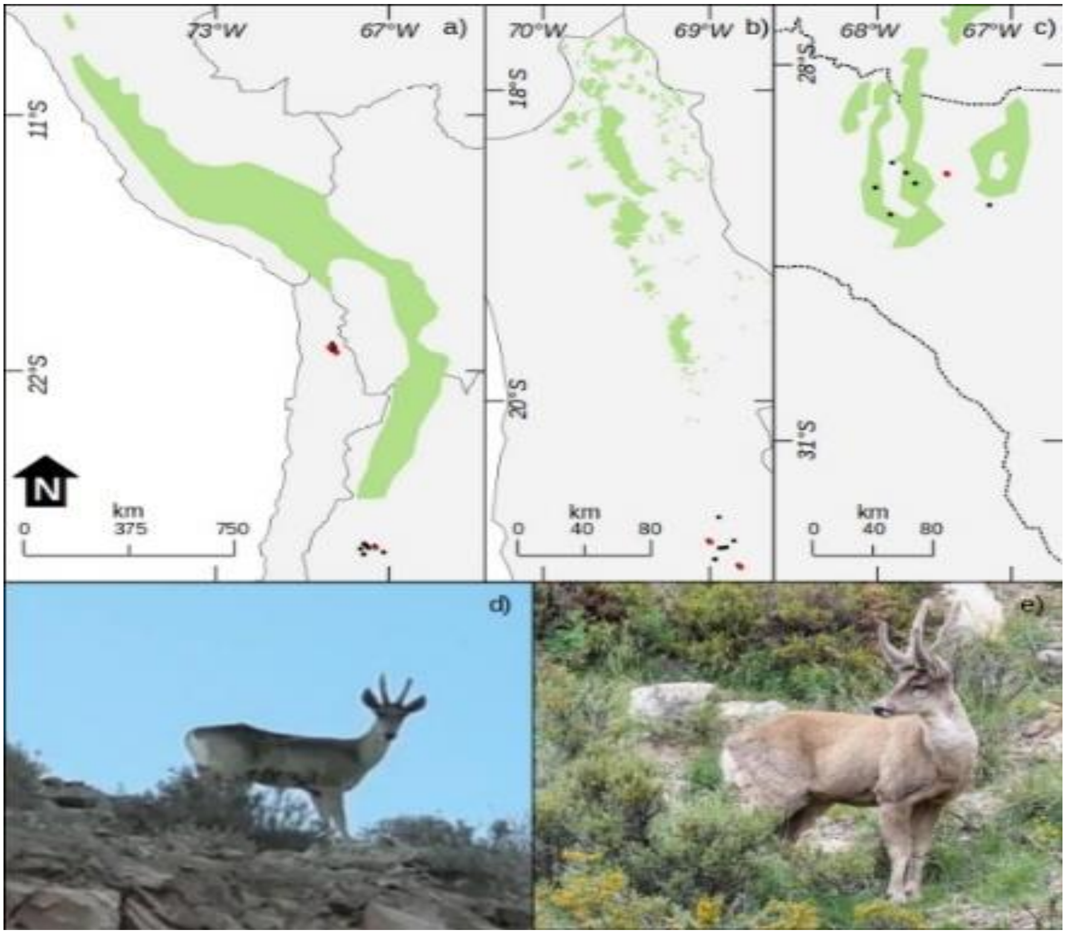

Figure 1. Sightings of taruka in Huatacondo and La Rioja Province. a) Sightings in relation to the proposed distribution range from the IUCN assessment, b) Sightings from Huatacondo in relation to the distribution range proposed by Mata et al. (2019), c) Sightings from La Rioja in relation to the distribution range proposed by Guerra & Pastore (2019), d) Male recorded at the mining area Quebrada Blanca 2(Teck Resources Limited; ©Ismael Horta-Pizarro), and f) Male recorded at Sierras del Famatina (©Gonzalo Clifton-Goldney). Black dots are the sightings published in this work, red dots are previously reported records in the study area (Bonacic et al. 2011; Sielfeld & Guzmán 2011; GBIF.org 2023), green areas represent proposed distribution range by a) the IUCN Red List Assessment, b) Mata et al. (2019), and c) Guerra & Pastore (2019). Dotted lines represent the limit of La Rioja Province, white area the Pacific Ocean, grey area South America, and black lines are international borders.

Material and Methods

The study area includes the Huatacondo Village in Chile (20°59'S 68°55'W) and the Sierras del Famatina and Velasco in La Rioja Province, Argentina (29°11'S 67°50'W). Both areas are arid environments at an elevation between 2000 and 4200 masl and dominated by canyons and gullies. Vegetation is characterised by montane grasslands and xeric and montane shrublands (Olson et al. 2001). The climate is identified as a seasonal regime of precipitation with a long dry season, usually between April and November, and a subsequent short rainy season, usually between December and March. According to Köppen climatic classification, the study area includes the cold desert (BWk; mean annual temperature <18°C, annual precipitation <200mm; Peel et al. 2007; Chen & Chen 2013).

According to distribution range assessments, both areas are entirely isolated from its primary distribution (Guerra & Pastore 2019), and not even included within the predicted global distribution for the species (Barrio et al. 2017). There are four published sightings of taruka in the study area: two from Huatacondo that included footprints from south of Huatacondo (Bonacic et al. 2011) and a sighting of an adult male from Quebrada Blanca Mining Area (Sielfeld & Guzmán 2011), and two from La Rioja with a specimen from the Famatina Mountain range (GBIF.org 2023) and different social groups sighted in the Sierra de Velasco (Cajal 1983).

In this work, we report unpublished sightings of taruka in the study area verifying their veracity. These were gathered from i) technical reports made by private consultants, universities, and NGOs, ii) complaints found at wildlife services, iii) posts from social media websites, iv) interviews with local people, and v) collaborators' unpublished data. Considering the hunting value of the taruka, we do not reveal the names of those who made the sightings, so as to avoid their being contacted by poachers. All new sightings were described by year, spatial location, and type of encounter, direct or indirect. Once available records were gathered, these were mapped together and compared with previously published records in the area and with predicted distributions of the IUCN assessment and country-level assessments (Argentina: Guerra & Pastore 2019; Chile: Mata et al. 2019). All spatial analyses were performed using QGIS 3.4.6-Madeira (QGIS Geographic Information System. Open-Source Geospatial Foundation Project. http://qgis.osgeo.org).

Results and Discussion

Twelve new unpublished sightings were confirmed for Huatacondo (six records) and La Rioja Province (six records; Figure 1, Table 1). Only one of them corresponded to an indirect encounter with taruka (faeces).

Sightings from the Huatacondo area were from local farmers, mining workers and wildlife consultants. Sightings from La Rioja Province were made by tourist operators, agents from the National Parks Administration of Argentina (APN) and the monitoring program that is performed by the NGO Natura Argentina. None of the records match the distribution range proposed by the IUCN Red List Assessment (Barrio et al. 2017). With respect to country-level assessments, the Huatacondo area was not included within the Chilean distribution range proposed by Mata et al. (2019). On the contrary, sightings from La Rioja in Argentina match the current distribution range proposed for that country (Guerra & Pastore 2019).

It is important to note that there are no protected areas in these localities, therefore animals and their habitat may be exposed to an unregulated relationship with local people and mining companies. This is the situation at Huatacondo, where taruka inhabits the mining area Quebrada Blanca 2 (TECK Resources Limited) and the surroundings of the mining area Collahuasi (Anglo American). So far, TECK has recognised that there are individuals using the area, but neither monitoring programs nor management actions have been performed to assure these animals are not affected by mining activities. Considering the pressure from mining companies to develop future projects in the area, we urge environmental authorities to i) propose the creation of a protected area to ensure the survival of taruka and its habitat at this locality, and ii) demand that mining companies implement monitoring programs and management actions to minimise negative effects of anthropogenic interventions.

Regarding the lack of protected areas in La Rioja, there are efforts to create a conservation area within the Sierras del Famatina. Today, NGO Natura Argentina, environmental authorities and local Universities are having conversations with local communities to define the specific location and spatial extent of this protected area. Unfortunately, it is not possible to define protected areas in the surroundings of

Huatacondo. Land is owned by either local communities or private mining companies, and none of them wants a protected are within their property. Considering that fact, other ways of protection, such as defining actions and demeanour of healthy coexistence between people and wildlife, must be implemented there.

We hope our study motivates actions to protect taruka in both areas, particularly because they represent its southernmost populations in their entire distribution range. In addition, they seem isolated from the main currently recognized distribution. It is crucial to consider the creation of protected areas when possible, gaining recognition for taruka presence from environmental authorities and mining companies, and implementing monitoring programs and management actions, all necessary steps to secure the survival of taruka in these regions.

Table 1. Taruka Sightings in Huatacondo and La Rioja: Compilation by LC, IHP, VL, HP, CS and LS correspond to the author's initials, with 'MA' denoting 'Mining Area'. To prevent inappropriate use of the reported information recorder names are unavailable (authors to be contacted for additional information).

id	Lat	Long	Location	Year	Type of Sighting	Compiler
1	20°46'57"S	68°59'24"W	Huatacondo	2023	Individuals	IHP
2	20°56'7"S	68°54'27"W	Huatacondo	2021	Individuals	Local farmer pers. comm.
3	20°58'51"S	68°59'8"W	Huatacondo (MA)	2020	Individuals	Mining worker pers. comm.
4	20°58'53"S	68°58'10"W	Huatacondo (MA)	2020	Individuals	Mining worker pers. comm.
5	20°58'33"S	68°56'57"W	Huatacondo (MA)	2021	Individuals	IHP/CS
6	21° 3'10"S	69° 0'34"W	Huatacondo	2021	Faeces	Private consultant pers. comm.
7	29° 9'57"S	67°13'4"W	La Rioja	1990	Individuals	HP
8	28°59'50"S	67°43'59"W	La Rioja	2022	Individuals	VL/LS
9	28°54'57"S	67°47'46"W	La Rioja	2016	Individuals	LC/LS
10	29° 1'55"S	68° 0'32"W	La Rioja	2021	Individuals	LC/VL/LS
11	29°14'18"S	67°54'18"W	La Rioja	2021	Individuals	LC/VL/LS
12	28°50'16"S	67°53'32"W	La Rioja	2022	Individuals	LC/VL/LS

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An endangered deer in the wrong place?

John Jackson

We humans have transported many species of deer from their native lands to other countries around the World. Sometimes these introductions have flourished in their new-found homes – others not.

But what should be done when a species which was once numerous in its home range then becomes threatened as circumstances change there – yet it has also been taken by *Homo sapiens* to a totally different place where it is apparently thriving as an alien animal and may even be causing damage in farming, forestry or wildlife conservation sites?

Captive breeding can play an important safeguard in conserving vanishing wildlife species. But what may happen if they then escape, thrive in their new environment and maybe become a problem?

Here's one such case for SSC Deer Group members to think about.

The water deer (*Hydropotes inermis*) is classed as Vulnerable in the global IUCN Red List of Threatened Species. Its status was last updated in 2015. There are two geographically isolated subspecies – *H. i. inermis* on the east coast of mainland China centred around where the Yangzte meets the sea and *H. i. argyropus* across the Yellow Sea on the Korean peninsula.

It is the only true deer where the males do not have antlers.

Figure 1: Male Chinese water deer (Hydropotes inermis). Source: Wikimedia Commons. Author: Altaileopard (CC BY-SA 3.0 License).

In both natural homelands, its status has got worse over the last few decades Habitat changes, hunting and human encroachment are all listed as part of the reason for the decline – an all too familiar story in conservation.

Yet on the other side of the planet, this deer was introduced into England and escapees from zoological collections and parks survived, bred and after a slow beginning are now spreading well away from their original stronghold – the riverine habitat of the Fenlands - a low-lying wetland region in Eastern England.

The water deer were first introduced into Great Britain in the 1870s. The founder stock was from China.

The animals were kept as a curiosity at the London Zoo in Regents Park until 1896, when the Duke of Bedford oversaw their transfer to the parkland of his Woburn Abbey in Bedfordshire in central England. . More animals were imported and added to the herd over the next three decades.

Around 1929 and 1930, 32 animals were transferred from Woburn to nearby Whipsnade zoological park, and released into the large grassland paddocks there. They prospered. Small deer are not easy to count accurately but the number of water deer roaming Whipsnade is currently estimated at over 600, while the population at Woburn is over 250.

Woburn deer park is also famous for captive breeding of **Père David's deer** (*Elaphurus davidianus*), also known as the ***milu*** or **elaphure**, which became extinct in China but which has now been successfully reintroduced back there from the captive stock abroad.

Many water deer escaped from these two parks and others were released, usually into wetland areas such as the low-lying Fenlands of Eastern England which were similar to the ecosystems in which this species lives in the Far East.

In France, a small free-living group existed originating from animals that escaped from an enclosure in 1960. The wild population was reinforced in 1965 and 1970 and although the species has been protected there since 1973, it is now believed to be extinct.

In recent years though this species has expanded its range and numbers across much of the east and centre of England, appearing in fields and woodland well away from wetlands. The explanations for the surge in the population and spread of this small ungulate are complex, cumulative and speculative.

Climate change may be one including warmer summers and milder yet damp winters.

Farming in Britain has also changed and evolved. The staple cereal crop in the region is wheat (*Triticum aestivum*). Traditionally that was sown in the spring. Over the last few decades, it is generally planted in the autumn for harvesting the following summer. That change in agricultural practice means that there are now fresh green cereal shoots for this deer to feed on at a once challenging or lean time of year when quality grazing and cover were in short supply.

In fact, the change in rate of expansion of range may not be a result of any real change in the novel surroundings, but simply the time lag for *H. inermis* adjustment to a new climate and an environment different from the home area.

So the reason or reasons for the more recent range expansion by Water deer in their new home aren't known and may reflect a number of favourable attributes. The key thing this that there's no doubt it's showing a much faster range expansion recently than it was say 50 years ago.

So, the Water deer in England is an alien or exotic animal that is fast becoming established and spreading in the wild, can be shot under the current UK's Deer Act legislation, could become a pest in agriculture, conservation and commercial forestry yet is classed internationally as Vulnerable in its native home.

According to The British Deer Society website, this English population may now account for 10% of the world's total.

So these animals are beginning to cause concern for UK government decision makers.

What do you think?

In Britain, should the alien *Hydropotes inermis* be

- eradicated as an invasive non-native, or;
- left to expand and consolidate here as a back-up or insurance policy in case the present or predicted threats can't be sorted in its native range and a Père David's Deer style reintroduction is called for or; -
- some compromise – a contained population at large in a restricted area of Britain, that can be as a reserve policy for the original wild stocks in the Far East, but which isn't allowed to expand to become a problem to land use in its new found environment.

Or do we require more information on recent trends and the current situation of this species status in its native ranges and on the steps required to conserve it there?

Maybe the fundamental thing is that a hunting-sensitive species with only two population centres in the world, both superimposed on high-density human populations is at permanent risk of changing circumstances.

A Guide to the Deer of the World

Charles Smith-Jones

A Guide to the Deer of the World is a long-overdue review of deer as we understand them today and includes several species which have only recently become known to science. Writing for a wide readership in a straightforward and easily accessible style, Charles Smith-Jones has produced an authoritative and attractive reference work with a strong conservation focus.

Lavishly illustrated throughout in colour, the Guide looks at deer evolution, biology and lifestyles in general before covering each of the fifty-five true deer, seven musk deer and ten chevrotain species as well as their subspecies in detail. Each is described individually with photographs, general information and distribution maps. In addition, there are comprehensive fact boxes which include descriptions of individual recognition features, habitats, behaviour, breeding and conservation issues for each member of this widely diverse and fascinating group of animals.

Forming an iconic and important part of almost all the world's ecosystems, many of the species featured are elusive and only very rarely photographed or observed. Any areas of taxonomical confusion and ongoing discussion are highlighted in readily understandable terms. At a time when our understanding of deer species and their relationships continues to evolve, the IUCN is acknowledged as the primary authority against which content has been determined.

This book will have a valued place in the library or on the coffee table of any nature lover or deer enthusiast.

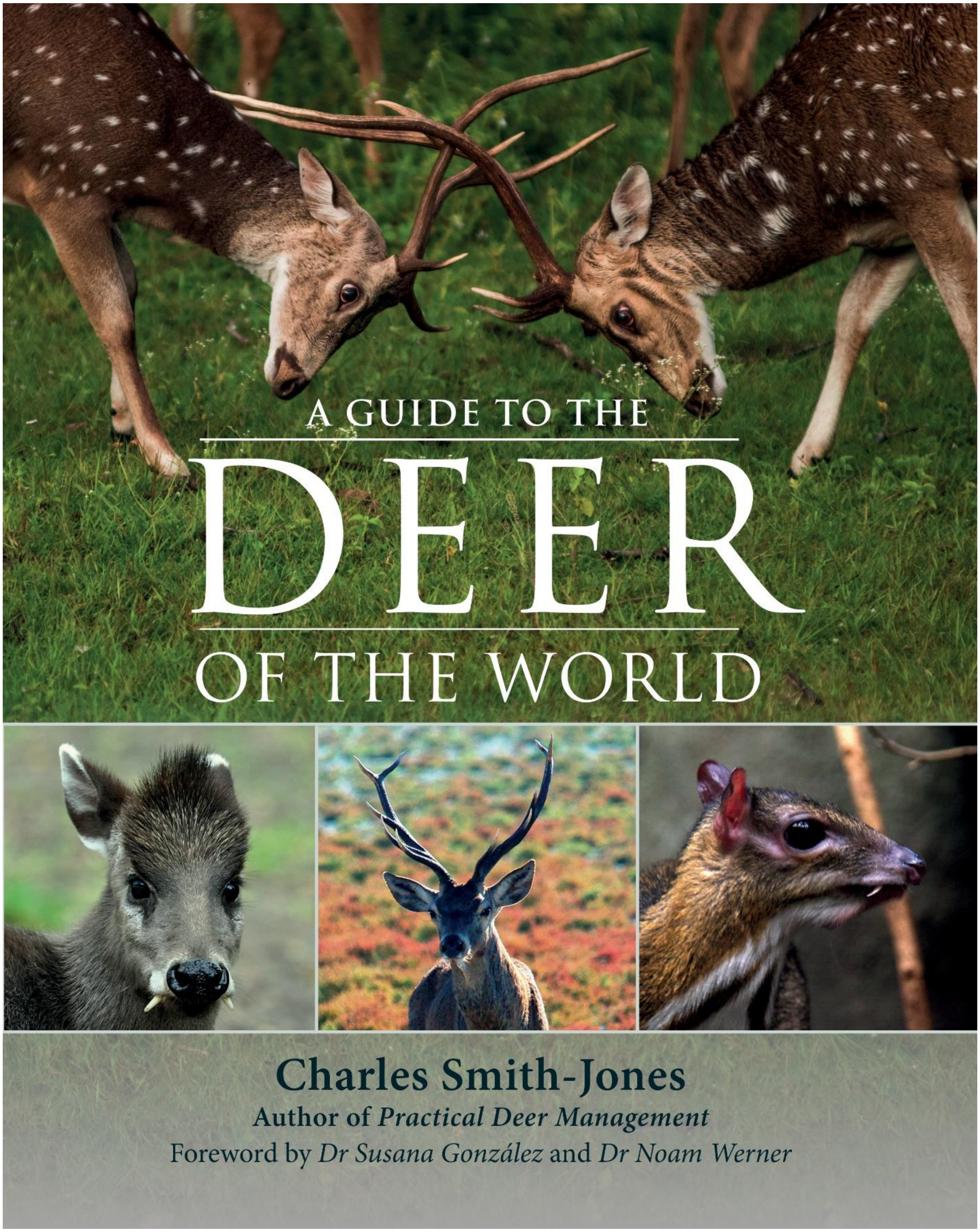
A Guide to the Deer of the World is published by Quiller Publishing in the UK and by Stackpole Books in the USA. A French language edition, *Le Grand Livre des Cerfs*, is also published by Éditions du Gerfaut, France.

Format: hardback, 320 pages, dimensions 27.6 x 2.8 x 21.8 cm

'This tour de force is an authoritative, attractive, accessible and comprehensive guide...this is a must-have book for every serious deer enthusiast.' - *British Deer Society Journal*

'Packed with information, key aspects of each deer species' biology are laid out in a clear and accessible format, and even the rarest species are beautifully illustrated.' - *Evolve, Natural History Museum*

'This is a rare feat: both coffee table book and academic reference book, engaging and informative in equal measure.' – *The Field*


A GUIDE TO THE
DEER
OF THE WORLD
Charles Smith-Jones
Author of *Practical Deer Management*
Foreword by *Dr Susana González* and *Dr Noam Werner*

Training workshop in Uruguay

Susana Gonzalez

We are inviting to participate to the training workshop that will be in hybrid format, practical sessions only in person at Instituto de *Investigaciones Biologicas Clemente Estable* (IIBCE), Montevideo Uruguay and at Breeding Station Estación de Cria de Fauna Autóctona (EFCA), Piriapolis Uruguay.

The applications are open see in the flyer all the information. Not hesitate in contact in case of questions to iconservacionneotropical@gmail.com. Registration only by email dae@fcien.edu.uy.

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