

**INTEGRATING PEOPLE AND WILDLIFE
FOR A SUSTAINABLE FUTURE**

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MANAGEMENT OF INTRODUCED RED DEER IN PATAGONIA

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Abstract: Red deer (*Cervus elaphus*) were introduced to Argentina and occur between 39 and 45° south latitude. However, they may spread another 500 km north and south. Active reforestation is altering habitat structure and will facilitate further dispersal of deer. Red deer inhabit dense rain forests, ecotones, and steppe, where they impact plant communities. A comprehensive management plan is lacking. There is no information related to ecology, pathology and parasitism, harvesting, forestry design, interactions with livestock, or other wildlife species, socioeconomics, or politics. Uncontrolled translocations and high deer densities present a possible source of disease transmission. We argue that it is necessary to maintain low deer densities, particularly in national parks.

Resumen: El Ciervo (*Cervus elaphus*) fue introducido en la Argentina y se encuentra entre 39°S y 45°S, pero podrían extenderse otros 500 km hacia el norte y hasta Tierra del Fuego hacia el sur. La reforestación está alterando la estructura del hábitat y facilitará la dispersión futura del ciervo. El ciervo se ha establecido en densos bosques húmedos, ecotones y estepas, donde han tenido un impacto sobre comunidades vegetales. No se sabe si el ciervo compete con cérvidos o camelidos nativos. No existe un concepto global de manejo de ciervos. Falta información relacionada a su ecología, patología y parasitismo, cosecha, diseño forestal, interacciones con el ganado, socioeconomía y política. Transplantes incontrolados y densidades altas generan riesgos sanitarios. El objetivo más importante debe ser mantener baja la densidad de ciervos, particularmente en parques nacionales.

Key words: Argentina, habitat, management, native species, Patagonia, red deer.

deer in Argentina is fairly well known (Flueck and Smith-Flueck 1993). Our objective was to describe the results of red deer introductions in Patagonia, Argentina.

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HISTORY OF INTRODUCTION AND CURRENT DISTRIBUTION IN PATAGONIA

Twenty red deer were introduced in the 1920s in the province of Neuquén, Argentina. By the 1940s, red deer were common throughout the western parts of the province and the northwestern part of Río Negro. By 1950, red deer numbers were reduced substantially in Neuquén because of strong competition with domestic herbivores. Red deer spread from Río Negro to northern parts of Chubut. In southern Chubut, red deer were introduced several decades ago and are now well established. Recently, red deer expanded eastward into the steppe of Patagonia; in Neuquén and Río Negro they have already moved east of 70° longitude (Fig. 1).

Several areas in Chile were populated with red deer that emigrated from Argentina (Ortiz 1992). Mountain passes in the Andes south of the 39° latitude are very low with continuous forests and thus provide corridors for animal movements. We estimated the total number of red deer in Patagonia to be 50,000 to 100,000.

FUTURE DISTRIBUTION

The rapid expansion of red deer in Patagonia has been facilitated by several established focal red deer populations along the cordillera. The northern limit of the historical range of the native huemul (*Hippocamelus bisulcus*) reached 34° south latitude, and a huemul population still occurs at latitude 36° 50' south. Because red deer now exist near huemul populations and on former huemul range, we assume that huemul habitat was suitable for red deer. The potential northern limit for red deer may be an additional 500 km north of their current range. To the south, suitable habitat may exist as far south as Tierra del Fuego. McCorquodale (1991) reported the recent success of elk (*C. elaphus*) in colonizing a North American steppe with 16 cm annual precipitation, where the maximal reproductive rate was nearly reached (McCorquodale et al. 1988). McCorquodale (1991) concluded that absence of human disturbance was critical for colonization to occur. Similarly, the topography and climate of the Patagonian steppe and reduced levels of human activity provide adequate cover for red deer and may explain their recent expansion into steppe habitat.

The current interest in deer farming and hunting in parks has resulted in uncontrolled translocations and likely will determine future colonizations. In 1993, deer were released in an enclosure on private property adjacent to a national park; neither the

Argentina has a tradition of introducing exotic animals and the history of initial introductions of red

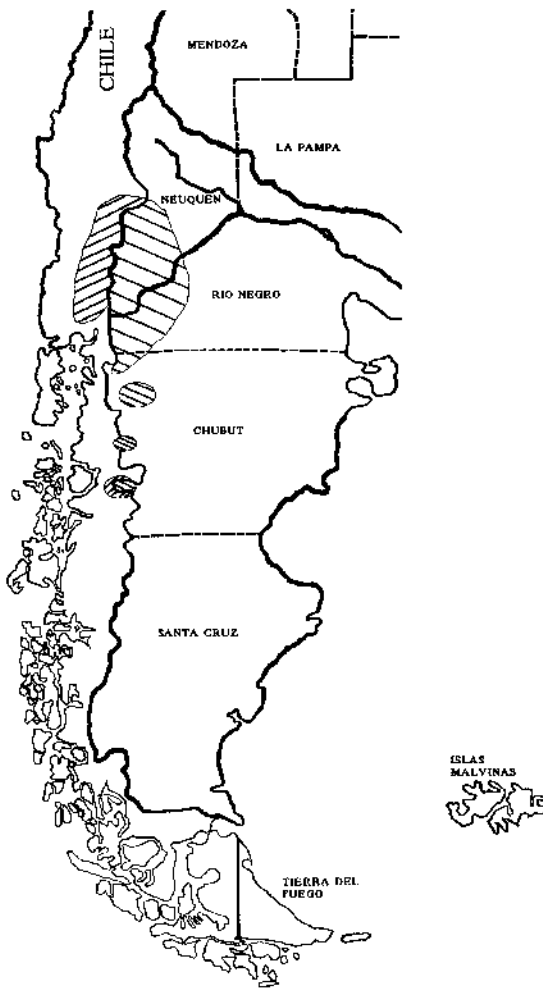


Fig. 1. Distribution of free-ranging red deer in Patagonia, Argentina, and Chile, 1993.

park nor the province were involved in the release. The owners planned to feed the animals during winter; however, fencing was too low after snow accumulation and all the animals escaped. Although many laws exist concerning wildlife and animal health, they are rarely enforced. Even transnational translocations are possible without any authoritative intervention (W.T. Flueck, Univ. Nacional del Comahue, unpubl. data).

Reforestation may influence the rapid spread of red deer in Patagonia. Although there is some reforestation with native tree species, mainly exotic species from the northern hemisphere were planted because they tended to grow fast (Dimitri 1972). Plantations often are found in zones that apparently have not supported native trees historically, and such habitat changes may facilitate the spread of red deer.

Red deer are found along the entire precipitation gradient from rain forests to treeless steppe (Veblen et al. 1989, 1992). However, at a given latitude, particularly in the south, red deer may presently be

found only in the ecotone habitats. The expansion southward (42° South) appears to occur principally in the ecotone, while the expansion into the steppe exists at latitudes with a longer history of deer occupancy and higher population densities.

ECOLOGICAL IMPACT

Negative impacts by red deer on the native flora were recognized early (Anziano 1962) and resulted in the official declaration of red deer as a pest species in Neuquén in 1959. Changes in the pattern of rejuvenation and plant composition in rain forests have been described for Argentina and Chile (Ramírez et al. 1981, Veblen et al. 1989). The impact of red deer on the native flora along the habitat gradient from rain forests to steppe has also been demonstrated (Veblen et al. 1992).

Concerns about possible competition between red deer and native fauna have been expressed for 2 cervids in Patagonia, pudu (*Pudu pudu*) (Lever 1985) and huemul (Rapoport 1976). Huemul distribution and population sizes have been reduced drastically in the last decades. Many former huemul areas are now occupied by red deer, which in part may be related to the disappearance of the huemul (Smith-Flueck and Flueck, this volume). Dietary overlap was reported for guanaco (*Lama guanicoe*) and red deer (Bahamonde et al. 1986). The distribution of herbivorous rheas (*Pterocnemia pennata*) also overlaps with current red deer range. Other changes in the native fauna can be expected (Putman et al. 1989). Pearson and Pearson (1982) found that a rodent (*Euneomys petersoni*) had been an abundant species for the last 8,000 years, but it practically disappeared with the introduction of exotic herbivores. This rodent apparently prefers non-forest areas with thick, moist grass; a habitat that has practically been eliminated by overgrazing. As red deer invade many areas that historically had little grazing pressure by large herbivores, we expect a negative impact on the associated fauna.

There are disease risks associated with uncontrolled translocations and high densities of red deer (Nettles 1992). Deer can be carriers of established local diseases, and may become carriers of introduced diseases, or become part of new cycles when intermediate hosts or new vectors are introduced (Miller 1989, Van Riper 1991). Mobility, high density, and the wide distribution of red deer provide significant opportunities for rapid spread of disease. The spread of livestock diseases to red deer populations could affect international trading opportunities. Some disease agents are not only difficult to diagnose but can result in substantial damage to wildlife and livestock (Woodford and Kock 1991). A pathological agent can range from an insignificant to fatal disease among different cervid species (Mackintosh 1992).

MANAGEMENT OF FREE-RANGING RED DEER

The Hunting Paradise

The first reports about red deer from Argentina were stories about excellent trophies from the prov-

ince of Neuquén. Draskovich (1951) reported antler weights >11 kg, with antlers of 9–10 kg common from 1930 to 1940. Average eviscerated weights were 175 kg (max.=220 kg). Von Bismarck (1951) and Gazzari (1978) confirmed antlers of 11 kg and 12.3 kg, respectively, and others mentioned body weights of 300 kg (Voigt 1962, Gazzari 1978). In 1991, the antler weight of a male shot in a national park was 13.6 kg, and recent antler weights of 9–11 kg and live weights of 289 and 294 kg were estimated (W. T. Flueck, Univ. Nacional Del Comahue, unpubl. data). Although comparable antler quality still occurs locally, mean antler and body weights have decreased considerably in many areas. For example, we measured body weights of 122 and 127 kg for males in an area with deer present for 67 years; antler weights typically were 2–3 kg.

Early reports (Von Bismarck 1951) explained large antlers and body weights by the availability of vast forests and evergreen bamboo, which provided an unlimited food supply even in winter. This opinion has been expressed recently (Vogel 1989), despite evidence that many subpopulations have deteriorated along with damage to the vegetation.

Current Management

Provincial Land.—The provinces of La Pampa and Neuquén have the oldest red deer hunting regulations in Argentina (Dietrich 1987). Red deer entered Río Negro much later, and general legislation was introduced in 1986. In Río Negro, red deer are classified as exotic large game. Their actual distribution was along 250 km north-south in the western part of the province. Currently, only 1 private ranch is licensed to hunt red deer. Hunting of red deer is prohibited in all other private and provincial lands with red deer presence in Río Negro. Chubut does not yet have guidelines for free-ranging red deer.

Harvest plans usually only included males; females and subadults are not hunted systematically. There is no required hunter's test, and hunting is restricted to the rutting period. The head of the animal has to be presented to an authority for registration and mandibles are sometimes requested. Analysis of mandibles and antlers of males harvested in Neuquén between 1977–1984 showed that 18–44% were shot contrary to hunting rules; i.e., they were misclassified by hunters regarding age and antler quality (Dietrich 1987).

National Parks.—Wildlife in national parks is regulated independently from federal and provincial laws governing fauna. Red deer hunting was permitted in Lanin National Park for 15 years, but hunting was started in Nahuel Huapi National Park in 1988. Major reasons for allowing hunting in national parks included: well-established red deer populations; interest of the public in hunting opportunities; better control of hunting, which already was taking place illegally; and to have a means to control population densities of red deer in the future.

Certain parts of national parks are divided into

hunting areas of about 4,000 ha each. For the last several years, each area had 6–8 hunting periods of 10 days each. During each period, 2 hunters and a limited number of personnel to help with guiding, cooking, and horses are allowed. Hunters can harvest 2 trophy males and 4 other deer. This system provided abundant hunting opportunities, but created the possibility of eliminating trophy hunting because 4,000 ha cannot provide an annual harvest of 12–16 trophy males for very long (Drechsler 1988). Although hunting regulations attempted to optimize antler quality, there was a serious lack of effective control over the type of hunter. There are no demands for professionalism when hunting, which stems from the philosophy that hunting is a right and not a privilege. Also, a management concept which includes females and subadults is not part of these regulations. Concurrent with short hunting periods (10 days) and 6–8 hunting groups/zone/season, it is unlikely that the individual hunter had a long-term interest in the zone, and consequently there is no coherent management possible.

Private ranches occur in the buffer zone bordering the core areas of the national parks. Since 1991, park administrators have requested that landowners present a management plan, and only upon approval can they pursue hunting of red deer. Permits for females are only required when animal products are commercialized, but special tags and regulations only pertained to animals that are commercialized. Landowners sometimes sold hunting rights for trophy males to citizens or foreigners.

Poaching.—In general, ineffective control of poaching (Dietrich 1987) under park, federal, and provincial laws have caused much social conflict. Even organized poaching for meat apparently had little effect on the population dynamics, whereas poaching for prime males and especially for velvet antlers may be hindering management. Poaching continues due to a lack of control officers and small fines (ironically, smallest in national parks) did not curb poaching. However, even if the actual impact was insignificant, landowners often perceive that lack of appropriate laws and enforcement as severe and appear to be discouraged from implementing any private management efforts.

OUTLOOK

Extensive areas in national parks and adjacent provincial and private lands contain red deer populations at high densities. In 1 study area, we analyzed herd composition in summer through winter in 1991 and 1992. The cow/calf ratio in early summer was 1:0.8 and remained at about 1:0.65 until spring ($n = 1,304$). The current level of recreational hunting is insufficient to harvest the yearly surplus. Park administrators are working on ideas first expressed in a workshop (E. Ramilo et al., Taller sobre manejo del ciervo colorado, APN Argentina, 1986) to create hunting districts that will be leased for several years. Although the leases should be at least as long as the life span of red deer (e.g., 12–15 yrs), the first district will be leased for less time so

that the experimental design can be evaluated. There will be strict regulations regarding installations of facilities, and the conduct of hunting. A responsible technical person is required to have a university degree with a background in wildlife ecology. Accommodations will need to be provided for a park warden who will be present in the zone during the hunting period. If this experimental hunting system is successful, other areas currently under the old hunting system will be changed.

As local population densities increased and habitat quality changes, deer body weight and antler size will decrease. However, many people conclude that this phenomenon is solely a consequence of genetic degeneration, unfortunately resulting in misdirected efforts like introducing a "good" male. Not only is the effect of 1 introduced animal on antler size in free-ranging red deer populations minimal, but most importantly, these misconceptions lead people away from the real problem and its solution. In this regard, initial educational efforts are necessary so that large-scale management efforts can be accomplished. Fortunately, park biologists are well aware of the basic relationships between nutrition, genetics, population density, and antler/body size; hunting regulations in park areas seek to harvest surplus animals. However, due to locally decreased antler quality, the interest of trophy hunters has decreased considerably, and without this source of income, the presence of deer has become an economic threat to many private ranches.

The success of red deer management will depend on implementing basic research and monitoring programs. To ensure trophy production and conservation of the native flora and fauna, red deer densities must be managed. If not, population increases will cause direct conflict with other land uses. The practice of silviculture has to incorporate the presence of deer. Red deer not only compete for food with livestock, but present a possible source of disease transmission. Continued lack of management will not only prevent the use of a sustainable natural resource, but the productivity of the invaded ecosystems will not likely be sustained at their potential level.

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