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BIOLOGICAL AND HEALTH SCIENCES

Overhunting was proved to have turned the huemul into an endangered species

A study led by CONICET researchers and published in Conservation revealed that the southernmost deer in the world lost migratory traditions that are key to its survival.

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Werner Flueck contemplates the first male huemul with radio collar of Argentina at the Shoonem Protected Park of Chubut, Lago la Plata, Alto Rio Senguer, year 2017. Credits: JoAnne Smith-Flueck

In modern times, the huemul (*Hippocamelus bisulcus*) was mistakenly conceptualized as a species adapted to forests and exclusively to high mountains, with rocky environments and steep slopes. However, a recent study conducted by CONICET researchers and colleagues questions this concept, assuring that the huemul is not different from other cervids, and that the cause of its extraordinary decrease is the historical and prehistoric anthropic pressure that led to its extermination in much of its original territory in the Patagonian peninsula and allowed

it to survived exclusively in refuges in the high Andean forests.

“So this refugee species lost its migratory traditions (culturally transmitted cycle of moving from winter to summer ranges) and its access to various habitats such as valley-bottom meadows, modifying its feeding practices,” explains Werner Flueck, first author of the study and CONICET researcher at the “Nahuel Huapi” National Park, which is under the scope of the National Parks Administration.

It is estimated that of the original metapopulation in Argentina there are currently only 350-500 individuals left and split into 60 or more groups fragmented along 1800 km of the Andean mountains. One of the most prominent population groups is in the Shoonem Protected Park, Alto Rio Senguer, in the Province of Chubut, where research tasks are done with the support of the Department of Flora and Fauna of the Province of Chubut.

“The loss of migratory traditions of the huemul due to overhunting in the past and the establishment of human populations in areas inhabited by these animals puts this species in danger of extinction,” states Flueck. Besides, he adds “the forced confinement to regions of the Andes in areas classified as summer ranges can be a factor to explain the decrease in its population and the high proportion of specimens with skeletal disease and low longevity.

Historical information, telemetry and medical studies

The authors of the study managed to confirm the migratory tradition in a wide variety of habitats that the huemul had used in the past, combining open areas (grasslands) and wooded areas of the Patagonian peninsula, through archaeological information obtained by the discovery of bones or antlers that the males lose during winter, and from the compilation of historical records contained in naturalist accounts and other testimonies of travelers from the year 1521 onwards.

“According to historical data, the huemul had individuals that migrated seasonally from forested Andes areas classified as summer ranges to non-forested regions of the Patagonian peninsula to spend the winters. Moreover, in these wintering areas, it is estimated that many groups of huemul behaved as annual residents that shared habitat with guanacos and rheas or other steppe animals. In this sense, their behavior is very similar to that of other cervids”, describes Flueck, who is also a researcher at the Swiss Tropical and Public Health Institute based in Basel, Switzerland.

The loss is not only of habitat but also of a cultural pattern, as migration behavior is transmitted by mothers to the offspring; it is not genetic, explains the researcher and adds: “Without cultural transmission there is no possible migration, only occasional minimal movements due to climatic contingency. Additionally, these migrations must have been shared with other mammals such as guanacos as depicted in hunting cave images of ancient prehistoric inhabitants.”

In 1898, the Argentine naturalist Francisco Pascasio Moreno (1852-1919) had already published sightings in non-forested areas of Patagonia, where the huemul abounded and did not flee despite the danger they were facing. A year later, the German Carl Martin also had reported on a steppe area with patches of low-canopy and open forest where his expedition

group, in addition to seeing many groups of huemul while they crossed the area, hunted some to eat their meat during many weeks.

Flueck and colleagues placed radio collars (one with satellite GPS) on six individuals (three females and three males) from the Shoonem Protected Park, La Plata Lake sector, to analyze their movements between 2017 and 2022.

"The radio-tagged and geolocated huemul remained throughout the year in small territorial ranges with minimal seasonal elevational movements. That was how we confirmed that it is the only deer species in the world that inhabits summer mountain ranges throughout the year as a reaction to anthropogenic activities," Flueck explains and adds: "However, the anatomy of the huemul shows that it is adapted to grasslands (open and deforested areas). Unfortunately, the human presence eliminated their migratory traditions. This change decreased their reproductive rates and detrimentally altered their health."

Flueck has led several studies on the health of huemul. In one of those works, which was published in BMC Research Notes in 2020, the scientist determined that in Argentina 57 percent of huemul carcassses had osteopathology, and that 86 percent of those alive had this disease. These animals presented structural problems both in the skeleton and in the dentures.

"The head injuries involved tooth loss before death at a young age, which reduced feeding efficiency. Preliminary tissue analysis showed deficiencies of minerals such as selenium, copper, and magnesium, which are essential for bone metabolism" Flueck comments.

In this regard, the researcher comments that in high mountain summer range areas such as the Andes, the nutritional quality of the forage is lower compared to that of the winter areas to which the huemul do not have access due to human presence and the loss of the habit of migrating. "The few cases where a huemul descends into a valley, it generally does not survive due to dog attacks, hunting, or vehicle accidents. For this reason, most of the existing subpopulations of huemul inhabit remote mountainous areas, unattractive for human settlement and of little value for agriculture or forestry."

The six radio-collared huemul were examined by pathologists and biologists, in two cases also by a veterinarian; and blood samples were taken to assess their health. "In fact, one of the radio-collared males had practically no teeth, it only had one of the eight incisors, in such a way that he found it difficult to eat, and died of starvation; in addition to repeatedly suffering pain due to serious infections," Flueck laments.

Conservation opportunities

Extinction is an irreversible process, Flueck warns. "If the huemul becomes extinct, it would be a failure of the human system, and of the nations of Argentina and Chile, where it is endemic. Losing it is inexcusable and it is preventable," the scientist affirms and adds: "Large mammals, such as the huemul, have a relevant role in the functioning of an ecosystem."

If the lack of a migration behavior explains the high degree of bone disease and the absence of numerical recovery of the huemul, the researcher stresses that "part of the solution would be the reintroduction of the huemul into historically used wintering areas, in those areas where anthropic and environmental threats can be neutralized. Through good monitoring, the effect of

anthropic and environmental threats can be neutralized. Through good monitoring, the effect of this measure on health and on the population's response could be verified. This would then prove the feasibility of creating 'source' populations again, and with that a phase of recovery of the species."

"The recently published study broadens the knowledge about the huemul and provides useful and concrete tools to increase the possibility of recovering it. We believe that it will be a fundamental part to develop a conservation strategy for the conservation and recovery of the southernmost deer in the world," concludes Flueck, who is also an active member and co-founder of the Shoonem Foundation, whose objective is to collaborate with the government to conserve the natural resources of the Senguer River basin in the Chubut province.

Breeding stations for huemul

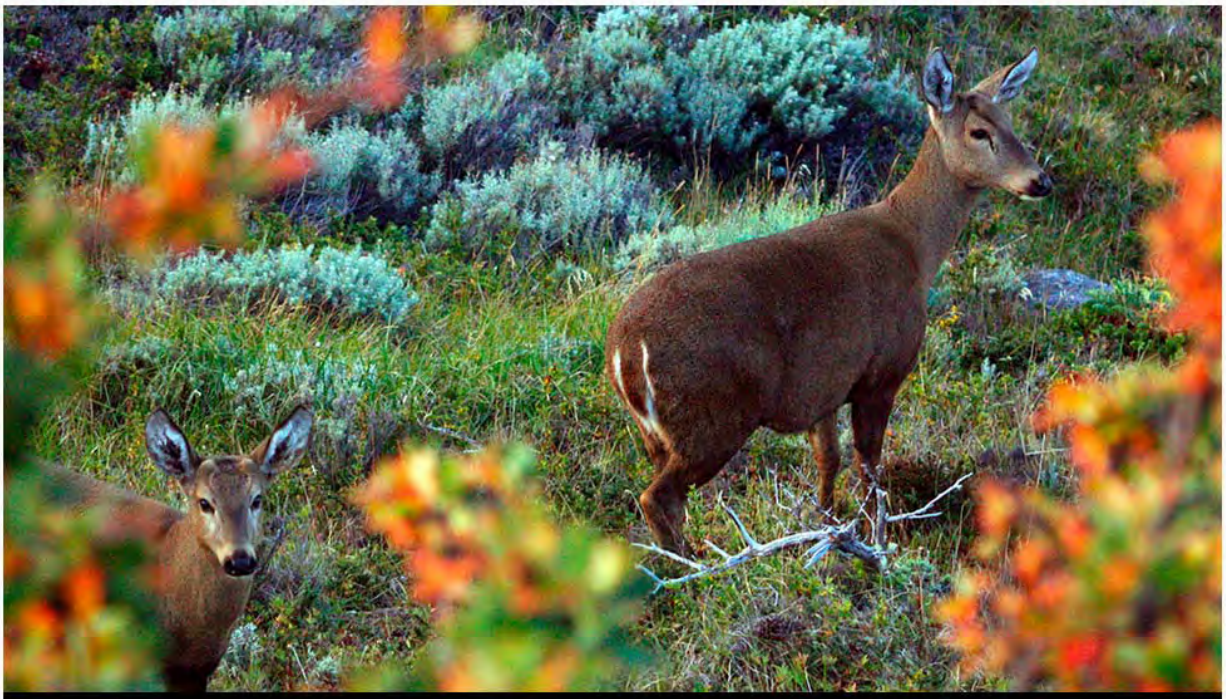
In Argentina, for instance within the framework of the Delta Conservation Program, the Temaiken Foundation is dedicated to promoting the recovery of the Swamp deer (*Blastocerus dichotomus*), also in danger of extinction. As part of the "Scientific-Technical Committee of the Swamp Deer ", this foundation assists the affected specimens by controlling the rescue and rehabilitation of those who are injured and their subsequent translocation to appropriate areas. There are several cases of young specimens that require a breeding process in human isolation in order to be reintroduced. Similarly, through a donation from the Erlenmeyer Foundation of Switzerland, Flueck and his colleagues at the Shoonem Foundation were able to complete the construction of a rehabilitation and breeding station for huemul to achieve the same goal, but are looking for additional funds for all the logistics the project requires.

By **Bruno Geller**

Translation: **Cintia B. González**

References:

Flueck, Werner T., et al. "Loss of Migratory Traditions Makes the Endangered Patagonian Huemul Deer a Year-Round Refugee in Its Summer Habitat." *Conservation* 2.2 (2022): 322-348. **https://doi.org/10.3390/conservation2020023**



De la metapoblación original en Argentina solo quedan entre trescientos cincuenta y quinientos huemules fragmentados en unos sesenta grupos a lo largo de 1800 km de los Andes. Créditos: JoAnne Smith-Flueck