

## 5.- CONCLUSIONES Y RECOMENDACIONES

- EL ANALISIS ECONOMICO DEL PRESENTE TRABAJO SE ENFOCA A LAS 103 ESPECIES DE CAZA DEPORTIVA QUE SE MANEJAN EN MEXICO Y QUE REPRESENTAN TAN SOLO EL 3.4% DE LOS VERTEBRADOS SUPERIORES TERRESTRES SUSCEPTIBLES DE ALGUN TIPO DE APROVECHAMIENTO.

- LA ACTIVIDAD CINEGETICA ES GENERADOR DE UNA IMPORTANTE FUENTE DE INGRESOS AL PAIS; DURANTE LA TEMPORADA 1988-1989 SE ESTIMA EN MAS DE 50 MIL MILLONES DE PESOS SU APORTACION, EN DOS VERTIENTES, UNA A LA TESORERIA DE LA FEDERACION, Y OTRA COMO DERRAMA EN DISTINTOS SECTORES DE LA POBLACION HUMANA.

- LA FAUNA SILVESTRE ADEMAS DE LA IMPORTANCIA ECONOMICA QUE REPRESENTA EN LA ACTIVIDAD TURISTICA - CINEGETICA, DEBE SER REVALUADA EN EL CONTEXTO NACIONAL DE LOS RECURSOS NATURALES RENOVABLES, COMO PRODUCTOR DE CARNE, PIEL Y SUBPRODUCTOS, PARA LA INDUSTRIA ALIMENTICIA, DEL VESTIDO, BIOMEDICA, ARTESANAL, ETC., O BIEN POR SU IMPORTANCIA BIOLOGICA, ECOLOGICA Y CULTURAL.

- EXISTEN 3 AREAS QUE POR SUS CARACTERISTICAS DE DIVERSIDAD BIOLOGICA, ABUNDANTES POBLACIONES Y CALIDAD DE SUS TROFEOS DE CAZA VIENEN DESARROLLANDOSE Y VAN A LA VANGUARDIA COMO POLOS REGIONALES DE LA ACTIVIDAD CINEGETICA EN EL NOROESTE LOS ESTADOS DE BAJA CALIFORNIA, BAJA CALIFORNIA SUR, SONORA Y SINALOA, EN EL NORESTE; COAHUILA, NUEVO LEON Y TAMAULIPAS Y EN EL SURESTE YUCATAN Y CAMPECHE; SIN EMBARGO, ES FACTIBLE PENSAR EN EL DESARROLLO DE OTRAS REGIONES DE OTROS ESTADOS POR LAS CARACTERISTICAS APROPIADAS QUE PRESENTAN, INCORPORANDO PROGRAMAS DE CRIA EN CAUTIVIDAD Y SEMICAUTIVIDAD, MEJORAMIENTO GENETICO, MANEJO Y MEJORAMIENTO DEL HABITAT, PROCURANDO OPTIMIZAR LA DOBLE FUNCION DE LOS ECOSISTEMAS NATURALES: EL APROVECHAMIENTO RACIONAL Y LA CONSERVACION DEL MOSPLASMA TANTO VEGETAL COMO ANIMAL.

## The Dangers of Exotic Wildlife Introductions

Bruce L. Morrison<sup>1/</sup>

## Introduction

As European man discovered and settled new lands, he brought with him animal species from his homeland. Initially, these species consisted of sheep, goats, horses, and cattle. Their purpose was to provide food and transportation as new continents were explored. After conquest was completed and civilization was established, he started importing wild species of animals from various points around the earth. For hundreds of years these animals were released into the wild with no thought of habitat requirements or competition factors with native species. When man's activities reduced or eliminated a native species, it was usually replaced with an exotic, again with no thought of its affect upon native biota. If large mammals were absent in the new lands, species from home were released with no consideration for an ecosystem that evolved without them. Only in the last few years have we begun to understand the devastating impact that exotic introductions have on native flora and fauna. The new and growing science of biodiversity has alerted us to the complex interactions of all species, both plant and animal, in an ecosystem that has evolved over thousands of years. The injection of an outsider into this system, be it man or one of his desired wildlife species, has wrecked havoc upon native wildlife on continent and island alike. The number of wildlife and plant species lost reaches into the thousands and the cost of attempting to control these introductions reaches into the billions of dollars. The dangers of exotics are many. Some of the major problems include competition for food with native species, behavioral competition with native species, the introduction of diseases and the cost of management activities undertaken to combat the negative impacts of exotic introductions.

## Food Competition

One of the basic requirements of any species is a food source to fuel its bodily functions. Native species and their food source, be it plant or other animals, have co-evolved over thousands and, in some cases, millions of years. Plants that are eaten have evolved growth patterns that allow reproduction and growth even when they loose

<sup>1/</sup> New Mexico Department of Game and Fish, Game Management Division.



part of the plant to the teeth of grazers. Predator and prey alike have evolved life styles that compensate for species survival in the face of adversity. When an exotic is injected into the ecosystem that has reached equilibrium over the eons, the results are devastating. A successful exotic will make use of any available food source, many times to the detriment of the native species that evolved with that food source. Data from food habit studies of the exotic aoudad (Ammotragus lervia) in Texas (Simpson et.al. 1978) and New Mexico (Ogren 1962) indicate that the endemic desert bighorn sheep (Ovis canadensis mexicanus) will loose out in competition for the food resource. A study in northern New Mexico (Bird and Upham 1980) showed that competition between the aoudad and the native mule deer (Odocoileus hemionus) for browse species is critical during the fall season. This fall season is critical to mule deer when they are trying to put on fat reserves for the winter months. Studies in Texas (Henke et.al. 1988) have proven that blackbuck antelope (antelope cervicapra), Sika deer (Cervus nippon) and fallow deer (Dama dama) all have a higher relative rumen capacity than the native white-tailed deer (Odocoileus virginianus). This indicates that the exotics are better able to utilize a variety of food resources, especially in times of food shortages. Other studies in Texas show that on ranges where white-tailed foods are severely grazed or depleted and sufficient grass is available, exotics can thrive while white-tails may be facing a die-off due to malnutrition and starvation (Armstrong and Harmel 1981). Also, these same studies show that exotics, through their ability to eat browse, forbs, and grass, also can have an impact on the ranges carrying capacity for livestock (Armstrong and Harmel 1981). Again in Texas, another study showed that Sika deer have a greater ability to shift its diet to grasses when stressed by drought or over grazing than do native deer (Butts 1979). On Assateague Island, Maryland numbers of native white-tailed deer have dropped as numbers of Sika deer have increased, due to more diverse and adaptable feeding habits of the latter (Keiper 1985). There are hundreds of examples of exotic predators totally eliminating endemic species. This is most prevent in the Caribbean, Australia, and on islands throughout the oceans of the world where over 50 species of birds, reptiles, and amphibians have been driven to extinction by exotic predators (DeVos et.al 1956).

#### Behavioral Competition

Very little research has been conducted on behavioral competition between exotic and native wildlife species. However, some observations by the author in New Mexico point out the dangers that do occur. First, we must remember again that a native species evolved with the ecosystem within which it lives. The exotic is injected into a strange new world full of organisms it did not

evolve with. To be successful the exotic must out-compete the native for escape cover, bedding sites, and all other aspects of what we loosely call its "behavior". The most direct and devastating competition is when an exotic tries to take a native's place within the social structure of the native species. This was observed in the Manazo Mountains of New Mexico when a male aoudad gathered a harem of Rocky Mountain Bighorn (Ovis canadensis canadensis) ewes and attempted to breed them. Although the bighorn ewes did not accept the exotic ram and we eventually removed him from the area, there was no reproduction in the native herd that year. I have also observed the aoudad eject mule deer from preferred bedding locations and feed grounds during the hot dry summers of southeast New Mexico. In 1972, a livestock operator killed an aoudad ram when its aggressive behavior was preventing his cows and calves from obtaining water on his ranch. These few examples indicate the behavioral competition that has occurred in one area with one exotic. Extend this to every content and the over 250 exotic introductions that have been made and we begin to grasp the magnitude of the damage done.

#### Disease Introduction

The spread of numerous diseases throughout the world has been assisted by the intentional and unintentional introduction of exotic animals. Most introductions, especially those conducted prior to 1950, were carried out without any pathological examinations of the animals being introduced (Morrison, In press). An excellent example of this is the spread of plague through the accidental introductions of rats and mice from Europe. Studies of Sika deer and white-tailed deer in Maryland indicate that the exotic is better able to withstand infectious diseases and parasitism than the native deer (Davidson and Crow 1983). The aoudad of the panhandle of Texas provided us with a new wild host for a louse (Bovicola neglecta) which has previously been known only from zoo animals. Also, many important pests of domestic livestock have been isolated from exotics. The aoudad has been shown to be a carrier for blue tongue, infectious bovine rhinotracheitis, and epizootic hemorrhagic disease (Hampy et.al 1979). The presence of antibody titers to these diseases in an exotic that has a reputation for long distance movements a very real threat to the livestock industry of the southwestern United States and Mexico. The author has observed pink-eye in aoudads in New Mexico and elaeophorosis or sore-head is prevalent among aoudad in the Palo Duro Canyon of Texas (Pence and Gray, 1981). In Australia, the introduced Asian water buffalo (Bubalus bubalis) is the major reservoir of bovine tuberculosis (Letts et.al 1979). The Australian government is attempting to eradicate bovine tuberculosis but cannot because of the prohibitive expanse of eliminating large



populations of the exotic buffalo (Ridpath and Waithman, 1988). Other diseases may still be waiting out there to devastate native wildlife and/or domestic livestock when the environmental conditions are conducive to it's outbreak.

#### Management and/or Control Expenses

One of the most insidious results is the millions of dollars spent worldwide to control and manage accidental and intentional releases. Looking again at the water buffalo problem in Australia, the government has spent over a half of a million dollars building fences and in shooting programs in attempts to control and eradicate them (Ridpath and Waithman 1988). They have also expended millions in attempts to control the exotic rabbit. The government of Great Britain has established, staffs, and funds a governmental agency whose sole responsibility is the control of introduced exotics (DeVos, et.al 1956). Over the past 20 years, the state of Texas has spent millions of dollars on research attempting to determine the effects of exotics on native ungulate populations. These unforeseen costs of exotic introductions have utilized economic resources that could have been dedicated to research and management of native species. The necessary control and management of introduced species also utilized a vast amount of human resources that could be better used elsewhere.

#### Conclusion

As can be seen, the introduction of exotics has many dangers, all of them with a direct impact on native wildlife species. The continued introduction of exotics will cause a great change in wildlife populations throughout the world until the human race is without the benefits of native flora and fauna that once flourished throughout the land. We must take positive and responsible actions to prevent the spread of exotics, if for no other reason than to maintain the biological diversity of the lands we have conquered. Perhaps it was said best in 1955 by a well known wildlife biologist, Dr. Oliver Hewitt, when he was discussing the introduction of the European rabbit into the United States, "Surely our science has reached a point where we are justified in condemning this ignorant and irresponsible gamble."

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