DEER SPECIALIST GROUP NEWS

NEWSLETTER NO. 13 March 1996

SOUTH AMERICA

DEER USE ON THE RIO DAS MORTES INDIAN RESERVATION

Frans Leeuwenberg

The cerrado biome occupies 23% (ca. 1,860,000 km²) of Brasilian territory. However, almost 50% of the native habitat has been replaced by large-scale soya cropfields and cattle-breeding pastureland. Deer populations have suffered strongly from habitat fragmentation, and poaching by the colonists have diminished or totally depleted populations. In the largest cerrado reservation of the South American continent in the central west of Brazil, Xavante Indians occupy a natural area of 229,000 ha, bordering the Rio das Mortes, a principal tributary of the Araguaya river in the state of Mato Grosso. This reservation is known as the Rio das Mortes Avante Reservation of Pimentel Barbosa and has a total population of approximately 600 Indians. The area's physiology is 90% intact. Four species of deer inhabit the area: marsh deer (*Blastocerus dichotomus*), pampas deer (*Ozotocerus bezoarticus*), red-brocket deer (*Mazama americana*), and grey-brocket deer (*Mazama gouazoubira*). Deer is a key part of the Xavante's diet and, therefore is hunted throughout the year.

As with most Indians, the Xavante completely depend on hunting and complementary fishing for their survival. Previous attempts by both government and non-government agencies to introduce cattle breeding have failed because it did not fit culturally. However, the indigenous territories have diminished and hunting patterns have changed due to the influence of the western market economy. The Xavante, worried about their decreasing food resources, requested assistance with a wildlife management study on their reservation in order to recover from the "observed" declining harvest of all game species. A project was executed from 1991-1993 with support from World Wild Fund and Wildlife Conservation International, and is awaiting funds for continuation in the coming years.

The characteristically marshy habitats for marsh deer and the extensive areas of opened and closed cerrado with murundum-ideal for pampas deer-are very well preserved on the Xavante reservation as the Indians continue to strongly resist any threat of deforestation. The Xavante are well-known for their warrior skills, which keeps farmers and goldrushers at a distance. Besides, the Indians only keep a very small group of cattle-less than 100 head-at a distance from the Etenhiritipa village, and the pastureland for this herd is inside degenerated habitats, damaged during the gradual illegal invasion by farmers in the 60s and 70s.

The main part of the study was conducted from 1991-1993 and concentrated on analyzing the hunting practices, dispersion of hunting by the Xavante, and quantifying the harvest rates, sex ratios, and age distribution of harvested populations. It was soon discovered that hunting was concentrated in approximately 30% of the territory for many years, but immigration from surrounding habitats slowed down the visible declines in the game populations. It appeared that the impact of hunting is basically on two species of deer, the marsh and pampas deer. The other two species are rarely hunted; the red brocket deer is restricted to the gallery forest, which is visited less by hunters than the open habitats, while the gray brocket deer, due to its size, is better protected by the scrub vegetation of the cerrado.

In a 33-month period between 1991 and 1993 all hunting data and locations were registered and lower jaws and skulls were gathered for age classification. Three young men have been trained in the collection of data, and classification of age classes for deer and peccaries. The evaluation of the preliminary results with the tribe council showed that the area with extreme hunting pressure was eliminated after 1991 and during the following years the hunting range shifted to different extremes of the Xavante reservation. All names of species and hunting locations on the reservation were registered in the Xavante language. Only on a few occasions was it possible to weigh any of the harvested deer.

During this 33-month period 71 specimens of marsh deer were harvested, with a minimum of 16 in 1991 over an 11-month period. The proportion of juveniles under 18 months was low for marsh deer, suggesting a low

Continued on page 2

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production rate in three different sub-eas (13-25%). For this same 11-onth period a minimum of 33 pampas er was harvested, with a total of 141 ecimens for the entire 33-month study riod. The proportion of juveniles in e hunting bag was over 50% in two ears but drastically dropped to 16% in 993. There was a constant lack of ecimens over 4 years of age and the ex ratio of harvested animals came to does per buck. These data confirmed at the hunting in an area of 65,000 ha ad been very high in the past, espe-ially on the deer species referred to.

The findings of the first analysis vere discussed in a non-mathematical vay with the community council, draw-ng parallels with hunting patterns of aguar (*Felis onca*) and puma (*Felis concolor*) and the previous hunting prac-ices of the elders. It was interesting to notice that the Indians reacted far more positively towards information on spa-cial use of their territory and age struc-ture of wildlife populations than to any of the quantitative data offered to them. The council decided that a hunting ban for certain species would never work since each family survives on the meat they obtain through hunting. In 1992 and 1993 hunting was restricted to the borders of the territory or kept at a distance from the overhunted area. In addition to restricted-area hunting, a rotative hunting system, and tax ex-emption incentives will also be tried. At this stage, it is too early to conclude whether the deer populations are re-covering, but the conditions for such recovery are visibly improving; atten-tion is being given to restricted-area hunting, protecting the reservation against poaching and deforestation, keeping the breeding cattle far from wildlife populations, and wildlife man-agement awareness for surrounding Indian populations. When developing a culturally adapted management plan for the Rio das Mortes reservation, this important and extensive cerrado area of over 300,000 ha can be used as an example of integration of scientific tech-niques and indigenous, traditional em-pirical knowledge.

With the preservation of indig-enous communities and the maintainence of their traditional sus-tainable use of natural resources, many more large nature areas can be effi-ciently protected, while rational use of populations can be tolerated. In con-trast to national parks and reserves, Indians can be the most efficient guard-ians of their territories.

BRAZIL

CYTOGENETIC AND TAXONOMIC ANALYSIS OF *Mazama* FROM BRAZIL

Susana Gonzales

Among deer, the genus *Mazama*, (brocket deer), is a controversial taxon. Currently 6 species are recognized: *M. americana*, *M. nana*, *M. gouazoubira*, *M. rufina*, *M. chunyi*, and *M. bricenii*. Cytogenetic studies by us and other researchers such as Taylor (1969), Jorge and Benirschke (1977) and Neitzel (1987), have revealed a poly-morphic chromosome.

Our research is intended to inves-tigate brocket deer individuals from Brazil to identify karyotypic variations. Biometry, morphometry, polymorphism protein by electrophoretic assays and DNA variation of the sample also will be included. All these data will be impor-tant to understand the complex tax-onomy of this genus.

At present, tissue from 50 indi-viduals was obtained and the samples are being analyzed. The main source of samples is Amazonia. Next year we are planning to collect samples from southern, southeaster, and northwest-ern Brazil. Our research is being car-ried out without financial support.

PAMPAS DEER IN BRAZIL

The Pampas deer is an endan-gered species and is included in CITES Appendix 1. Habitat destruction and domestic animals like cattle, are impor-tant factors in the current situation for this species.

This major project is a study of two populations of this species, one from Pantanal and the other from Emas National Park. It includes 15 miniprojects (genetics, reproduction, disease, physiology and ethology), 30 researchers and 3 Research Institu-tions.

We have chosen two populations to begin a comparative multidisciplinary study - the Pantanal population shares the habitat with cattle and is an open genetic flux population; the other in Emas National Park doesn't have con-tact with cattle and is an isolated popu-lation. Comparative cytogenetic and protein level analyses will be done among these populations.

Hormone dossagen and collect of sperm to install a germoplasm bank to assess seasonal reproduction of the species.

Parasitological and infection dis-eases with the aim to find the role of pampas deer in the epidemiological chain specially related with cattle.

Behavior studies will try to find out about some reproduction aspect like group size and interaction between them.

The principal investigators are Prof. Aramis Augusto Pinto (UNESP), Prof. Luis Antonio Mtahias (UNESP), Prof. Raul Jose Silva Girio (UNESP), Dr. Goncala Maria Martins Arita (LARA-MARA), Prof. Isau Gouveia Arantes (UNESP), Prof. Nicolau Maues Serra Freire (UFRRJ), Prof. Joaquim Mansano Garcia (UNESP), Prof. Mateus Rodrigues Pranhos da Costa (UNESP), Prof. Newton Nunes (UNESP), Prof. Paulo Rodrigues

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Ramos (UNESP), Lic. Susana Gonzalez (IIB Clemente Estable), Prof. Jose Jurandir Fagliari (UNESP), Dr. Mauricio Barbanti Duarte (UNESP). The research is conducted with partial funding from the Fundo Nacional de Meio Ambiente do Brasil. It began in January 1995 and ended in January 1996.

A NEW SPECIES OF DEER IN BRAZIL (*Mazama bororo*)

J.M. B. Duarte and M.L. Giannoni

In 1992 we found in Sorocaba Zoo (São Paulo State), a phenotypically distinct brocket deer. The source of the deer was Capão Bonito city where some isolated Atlantic rainforest still exists.

The individual was transported to Facultade de Ciencias Agrarias and Veterinárias for detailed studies. Morphologically it resembles *Mazama nana* which inhabits southern Brazil, but the weight was 22 kg, heavier than *M. nana*. Its coloration is reddish and inside part of the limbs is darker. It had some white hairs inside the ear and a white spot in the upper lips, submandibular region and lower ventral (like *M. americana*). The biometric data were: height 57, metacarpi 13cm, metatarsi 21 cm and ear 8,5 cm.

The greatest differences were found in the karyotypes - it had 2n=37 and chromosomes 1, 2, 3, and 4 subtelocentric and arm ratio of 3.74, 3.331, 3,81 and 3.09. Chromosome 5 metacentric (1.42) and X submetacentric (1.64). The other chromosomes were telocentric, except for a fusion between chromosome 8 and 16, a submetacentric chromosome (1.64). Q bands were performed to arrange the chromosomes. C bands appeared interstitial in 1, 2, 3, 4, 6, 7, and 8. The acrocentric chromosomes had centromeric heterochromatic blocks but not the sexual pair. NOR band appeared in the middle part of the short arm of pair 1 and in the one third end of pair 6 (Fig 1). This cytogenetic study showed that this specimen had a different karyotype from other Brazilian deer and supports our hypothesis that it is a new species. For comparative analyses we have studied *M. gouazoubira*, *M. nana* and *M. americana*, and did not find a close relationship with these karyotypes. Skins with the name *M. bororo* were in the São Paulo Museum with the same locality of the individual analyzed by us. In 1995 we intend to study a larger sample of specimens and to assess the status of the species. We presume it may be endangered because isolated patches of Atlantic rainforest are all that remain in the region. This information will also aid in the creation of protected areas in the southeast of Brazil.

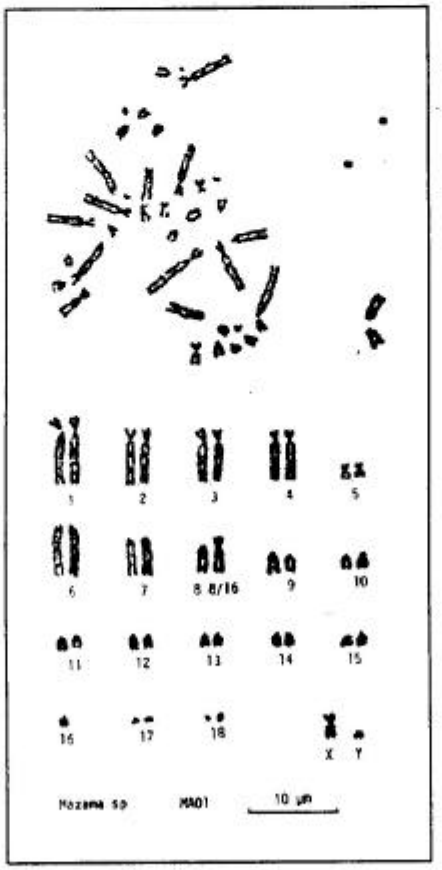

Fig. 1

NEWS & COMMENTS

Sociedade de Zoologicos do Brasil has formed a special group of members who are interested in Cervids. In March 1995 a meeting will be held to discuss captive breeding of deer, and also to begin the studbooks of Brazilian species. We are willing to monitor the captive population and create new guidelines for captive breeding.

III WORKSHOP ON THE CONSERVATION OF MARSH DEER

Laurenz Pinder

A group of 30 professional biologists attended this workshop, organized by the Companhia Energética de São Paulo (CESP) in association with the Conservation Breeding Specialist Group (CBSG) of the IUCN. The workshop was held at one of CESP's training centers in the city of Botucatú, State of São Paulo, Brazil, from 29 August to 3 September, 1994. Its main objective was to conduct a Population and Habitat Viability Analysis (PHVA) for marsh deer, *Blastocerus dichotomus*, and to draw recommendations towards the conservation of the species within its range. Brazilian Federal and State government officials contributed to the discussions, in addition to representatives of four Brazilian NGOs, wildlife managers, field biologists, veterinarians, and captive breeding specialists from Argentina, Brazil, Uruguay, and the United States. The event was covered by local TV News and by CESP's internal newspaper.

During the first two days of the workshop a number of papers updated the information on the status and ecology of the species. These papers also accounted for the occurrence of diseases in captivity and in the wild, and described the state-of-the-art techniques employed in field studies and captive management of marsh deer.

SOUTH AMERICA

AERIAL CENSUS OF PAMPAS DEER IN BAHIA SAMBOROMBON PCIA. BUENOS AIRES ARGENTINA

Mariano L. Merino and Flavio Moschione

In the past, Pampas deer was an abundant cervid in Buenos Aires Province. In the beginning of this century a significant decrease of the population took place related to human activities. Now the populations are fragmented and isolated to a relictual area of Bahia Samborombon, specifically in the wetland zone called "Cangrejal".

The main objective is determine and follow the population in the Bahia Samborombon using aerial census.

MARSH DEER DIET COMPOSITION IN THE IBERA RESERVE (Corrientes Argentina)

Mariano L. Merino and Marcelo Beccaceci

The Marsh deer is the largest species of South American deer. In Argentina it inhabits wetlands, coastal plains, the Paran delta and other marshy areas like Pilcomayo river coast and Ibera wetlands. The biology of this specialized deer is largely unknown. The main objective of this study is determine diet composition using a microhistological analysis of the feces. Trophic interaction with other herbivores such as *Mazama* and *Hydrochoerus* is also being studied.

NEWS & COMMENTS

PAMPAS DEER CONSERVATION WORKSHOP IN SAN LUIS

Mariano Merino

A pampas deer conservation workshop was held in September 1994 in Villa Mercedes San Luis. The workshops was organized by INTA-EEA-San Luis, Fundacion Vida Silvestre Argentina and Gobierno Provincial San Luis.

An action plan for the species in San Luis was developed by participants representing the following institutions: Provincia de San Luis, Ministerio de Industria, Turismo, Mineria y Produccion, INTA (Instituto Nacional de Tecnologia Agropecuaria) APN (Administracion de Parques Nacionales) and NGOs like FVSA (Fundacion Vida Silvestre Argentina) ACEV (Asociacion Conservacionista Equilibrio Vital) and Deer Specialist Group IUCN/SSC.

The objectives of the workshop were to:

1) determine current distribution

2) assess the conservation status of the pampas grasslands

3) determine use of the land and cattle incidence in the habitat and landowners role

4) identify conservation units to create protected areas.

The methodologies to be used for obtaining the information and the main guidelines for identifying priority units for conservation were discussed.

URUGUAY

URUGUAY'S LOS AJOS PAMPAS DEER POPULATION

Susana Gonzalez, Raul Lombardi, Rosario Ibarra and Giancarlo Geymonat

There are only two wild pampas deer populations in Uruguay, El Tapado in the north with 700 animals and Los Ajos population in the southeast which numbers 100. These isolated populations, the remaining fragments of a once widespread and abundant species, now survives almost entirely on private lands or Estancias. In Uruguay landowners fulfill an essential role in the conservation of this endangered deer. Hunting is forbidden in the enclosures of the Estancias, but the deer share the land with cattle.

The senior author has been monitoring Los Ajos population since 1985, but in 1992 we began monitoring on a monthly basis. Two methodologies are in use: we record population structure (number by age/sex class) with a zoom telescope along a transect from an automobile and we make counts from a fixed point on a hill, Sierra de Los Ajos (approx. 150 m.). Movement and behavior are also recorded and we hope in the near future to use radiotelemetry for more detailed ecological studies. Dead animals are collected for necropsy and genetic investigations by the senior author, and parasitological screening is being conducted in the laboratory of Dr. Perla Cabrera (Facultad de Veterinaria). In addition, a special education program is being developed with local communities that involves presentations in schools and in public places. Private stewardship of wildlife in Uruguay is an experiment and it remains to be seen how successful conservation will be in the hands of private landowners. Presently there are no incentives for landowners to maintain wildlife that are as powerful as the economic incentives in farming and livestock ranching. In 1994, the owner of Los Ajos began rice planting in the main enclosure containing 70-80 pampas deer. The impact of this new activity will be studied. To preserve these last populations some measures must be implemented to develop private protected areas. These measures must include exoneration of taxes by government agencies and other fiscal incentives to stimulate private conservation actions. Research results and conservation measures will contribute to the recovery of this threatened population.

We want to thank Mr. Carlos Arrarte Los Ages, landowner, for his contribution to our study. Field work is conducted with the support of Restitucion a la Vida Program, genetics studies with PEDECIBA (Uruguay) funds and in collaboration with Dr. Robert K. Wayne, Conservation Genetics, Biology Dept., UCLA.

SOUTH AMERICA

EL TAPADO PAMPAS DEER POPULATION

Susana Gonzalez

Since 1977 this population has been followed by several biologists- Alfredo Langguth, Pete Landa, John Jackson. In 1982, Dr. Dietland Müller-Schwarze and Donald Moore began to conduct research and in 1990, Moore eartagged about 20 newborn fawns. Valuable information has been obtained from these individuals.

This year we have monitored this population every three months and are planning to seasonally monitor this population next year. The objective is to follow the demographic trends and obtain samples for genetic research and parasitological tests.

The census methodology was transect counts by automobile. In November we did an assay using this method in the neighboring Estancias, and will also include them from now on. The last census showed an increase in the number of deer.

The first parasitological analyses performed by Drs. Cabrera, Sampaio and Hernandez revealed a low incidence of parasites. This annual study will give valuable results to design guidelines for pampas deer conservation in Uruguay.

We want to thank Mr. Jose Pedro Castro El Tapado landowner, for his contribution in our study. Field work is conducted with the support of Facultad de Ciencias, we thank also to Mr. Clemente Olivera (driver) for his help. Genetics studies were funded by PEDECIBA (Uruguay) in collaboration with Dr. Robert K. Wayne, Conservation Genetics, Biology Dept., UCLA.

FISCAL TAX EXEMPTION FOR LANDOWNERS

Last year we worked on the development of a law to allow tax exemption for landowners who have pampas deer. This work was done by a commission in the Ministerio de Ganaderia Agricultura y Pesca with participants from University, IUCN/SSC/DSG, Environmental Minister and Traffic South America. The commission has finished its work, but the governmental authorities haven't yet approved the law. We hope that for 1995 this law can be implemented as it will be an important step for pampas deer conservation in Uruguay.

PAMPAS DEER PHVA

As a result of the CBSG workshop, conservation actions by the governmental ministers have changed. They realized the important role that the landowners play in the conservation of this species. The Uruguayan President Dr. Luis A. Lacalle and the Environmental Minister authorities gave special recognition to landowners Mr. Jose Pedro Castro and Carlos Arrarte, certifying the role they have played in conservation. Also the United Nations Global 500 prize was given to Mr. Jose Pedro Castro in June.

CHILE

HUEMUL PROJECT

Dr. Robert Schlatter

The purpose of this project is to provide an ecological and veterinary assistance to multidisciplinary efforts attempting to conserve the Chilean huemul *Hippocameulus bisulcus*. Secondly, we are collaborating to develope new strategies for management based on modern methodologies to permit recovery of the population levels and reintroduction in other protected areas that have been previously occupied by the species in Chile.

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NORTH AMERICA

SELKIRK MOUNTAINS WOODLAND CARIBOU

Wayne Wakkinen

Sixty (60) woodland caribou were transplanted into the Selkirk Mountains of northern Idaho in 1987, 1988, and 1990 to augment the existing population. All animals were radio-collared and seven (7) are still being monitored. Information on seasonal habitat use, home ranges, reproduction and survival is available. A reliable winter census technique has also been developed.

High mortality and relatively low recruitment have prevented the population from expanding. Winter helicopter census revealed 47 caribou in 1991 and 1992, 51 in 1993, and 45 in 1994. The population appears stable but its long-term persistence is of course indeterminate. Mountain lion predation appears to be the most prevalent mortality cause, occurring during late summer and spring. Annual survival rates for collared caribou are 0.73 for adult females and 0.76 for adult males. So far, no plans to manage predators have been implemented.

A habitat suitability index has been developed to assist with evaluation of land management actions. Management emphasis has been directed to federal lands, but historic and present use of state lands is now receiving attention.

A revised Recovery Plan provides for establishing another subpopulation in the western portion of the Selkirks in Washington State. The transplant could take place in early spring 1996 or 1997 if it progresses. A population viability analysis is also in progress.

Correction

In the last issue of the newsletter, credit was improperly given to Dr. Jim Peek for *Status of the Columbian White-tailed Deer*. Alan C. Clark was the author.

COLUMBIAN WHITE-TAILED DEER

Alan Clark

Progress continues, albeit slowly, toward the recovery of the Columbian white-tail. Deer numbers in both populations are well above the minimums needed for delisting, however, habitat security is still a problem as most of the deer occupy private farms and ranches. Recovery efforts are currently focussed on securing habitat by means of conservation easements, land exchanges, and purchase.

The minimum viable population sizes in the Recovery Plan for the Lower Columbia River and Roseburg populations are 400 and 500, respectively. The discrepancy is due to differing sex ratios in the two populations. The Recovery Team is presently reviewing the adequacy of these numbers in light of recent research and theory on minimum viable populations.

Lower Columbia River Population: Overall numbers have leveled off after more than doubling during the 1980s from fewer than 400 to the present 800-1,000. The population inhabits an area of about 60 km^2 along the upper Columbia River estuary and, despite the increase in numbers, there has been no apparent increase in range. There are four subpopulations, each consisting of 150-250 deer. Two subpopulations occupy secure habitat on the Julia Butler Hansen Refuge for the Columbian White-tailed Deer. A third habitat must be secured to meet Recovery Plan goals. We are presently attempting to secure habitat for the Westport/Wallace Island, Oregon, subpopulation. There have been both progress and setbacks during the past year in achieving this objective.

On the positive side, the U.S. Fish and Wildlife Service purchased Wallace Island. The 234-ha island is the largest remaining relatively undisturbed area of native habitat (forested tidal swamp) still occupied by the deer. Most of the deer's present range has been diked for agriculture. The Service also made purchase offers to the owners of several small properties totalling about 200 ha near Wallace Island and intends to negotiate for conservation easements on an additional 300 ha.

Unfortunately, the 1995 Appropriations Bill provided no funds for this project ($1.5 million had been requested). Wallace Island alone is too small to support a viable subpopulation, so the goal of securing a third habitat has yet to be reached.

Roseburg Population: The latest population estimates indicate there may be as many as 9,000 individuals distributed unevenly over 1,200 km^2 of the Umpqua River drainage. As with the Lower Columbia population, management emphasis is on securing habitat. To meet the Recovery Plan goals, habitat sufficient to support a minimum of 500 deer must be secured in a legally binding and permanent manner.

In 1994, the Bureau of Land Management acquired a 2,630 ha ranch, now known as the North Bank Habitat Management Area, for the purpose of securing Columbian white-tail habitat. Oregon Department of Fish and Wildlife personnel surveyed the area using a Forward Looking Infra-Red Scanner (FLIRS) mounted in a helicopter. They identified 128 Columbian white-tails, as well as 180 black-tails and 25 unclassified deer. They also surveyed two other areas - the 1,133-ha Engle Ranch, and the 259-ha Ramp Canyon, which the Bureau is attempting to acquire through land exchanges. A total of 321 white-tails, 160 black-tails, and 50 unclassifieds were detected on these properties. Undoubtedly, some deer were undetected and some of the unclassifieds were white-tails; thus, at least 500 white-tails probably were present on the three areas combined. It appears the Recovery Plan goals for this population may be met if the Bureau is successful in acquiring the Engle Ranch and Ramp Canyon.

SANGAI POPULARIZATION AND CONSERVATION

Dr. Kh. Shamungou

The Manipur Brow-antlered deer, known locally as "Sangai" (the animal in waiting and looking at you), is probably the most endangered deer of the world. Today, about 100 head of the deer (Forest Department counted 137 head, consisting of 56 males, 65 females, and 16 fawns during March, 1994) are preserved in the unusual habitat of Keibul Lamjao National Park, on the floating "phumdi" (thick mat of organic debris upon which grass and vegetation grow), but in a very critical condition of obscurity as they are facing the all-around devastating factors of destruction of the feeding, bedding, and breeding areas. In fact, Keibul Lamjao, the only Sangai habitat is ecologically vulnerable and an event of political expediency or a natural calamity could destroy this small and isolated population of deer or reduce it to such a small size it could never recover. The following are highlights of the Sangai observation and popularization campaign since 1980.

The Sangai previously ranged over a wide area of the state before being driven by human activity to live in the 40 sq. km swampy area in the southwestern corner of the Loktak lake. However, they have adapted well. The development of hard and horney pasterns with splayed-out hooves have enabled them to keep their footing on the floating "phumdi". Their feeding habits, behavioral activities and reproductive cycle have all adjusted to the seasonal changes of the forage condition.

The park being a part of the great Loktak lake and because of its rich resources became a tussle among the people. It provides for the livelihood of the villagers settling around the area. As a result, there is a continuous demand for fishing, vegetable collecting, and grassy areas, etc.

The "Pabot", "Chingjao", and "Toya" hillocks, and a strip of lowland 100-200 metres wide called "Thangbral-Yangbi" are the only hard ground in the park on which the animals can take shelter during the heavy rains and flood. The "Thangbral-Yangbi" is ecologically significant. The "phumdi" on both sides is thick and almost settled, and is slightly submerged in water during floods. Moreover, it has more heterogenous grass cover than other parts of the park. Thus it acts as the centre of activity for the deer (Shamungou, 1990, *Deer* 8[2]). During the rainy season, Sangai are almost sedentary in this area and in the vicinity of "Toya", while in the dry months they straggle up to "Pabot" to the north. The distribution of this area in one way or another would ultimately pose a threat to the survival of the animal. The ideal home range of the deer would therefore be a combination of thick "phumdi", well settled hard ground with shallow water.

Although the deer population in the park increased from 14 head in 1975 to 137 today, the reproductive success shows fluctuations between 11-50 fawns/100 females with 25 fawns/100 females being the reproductive success of 1993-94. (It declined from 57 to 23 fawns/100 females during 1983-85, *DSG News*, 8). Such low and variable fawning rates is related to the presence of humans in the area during the breeding season (Shamungou, 1992, *Population and Habitat Viability Analysis Briefing Book*).

The following were observed as the main factors affecting the Sangai's habitat in the park.

Encroachment and exploitation of park resources. Most of the people around the park were facing the reality of living hand-to-mouth. They were demanding the total displacement of the area or at least reducing its size to about 10 sq km. They need reeds for their housing purposes, forage for their livestock, and vegetable and fish products for human consumption.

Livestock grazing. The illegal grazing of cattle and buffaloes is another problem confronted by the park. The buffaloes are seen entering deep into the park throughout the year, while the cows could not do so except during dry months. This has rendered many areas bare and increased the replacement process of desirable forage with unpalatable weeds.

Burning of "phumdi". There appears to be a firm relationship between the present habitat structure and burning of the "phumdi". It acts as a negative factor than can alter the vegetation of the park. The combined effect of the burning and heavy grazing or browning is responsible for the disappearance of the shelter grasses of the park.

Loktak Hydroelectric Project. The most important new aspect which may have a significant ecological ramification leading to the alteration of the deer's habitat is the Loktak Project. This project raises the level of the lake water in the park area to about 780 metres resulting in a serious inhibition of the rich cycling of the nutrients because it prevents the "phumdi" from settling down and coming in contact with the soil below, which normally occurs during dry months. The "phumdi" will float constantly and become thinner; when it reaches 80 cm or less in thickness it may not be able to support the weight of an adult animal.

The deer breed from January - April when the "phumdi" is settled on the ground. This natural process is affected by the project water. Therefore, the present project has led to the disruption of the unique ecosystem of the floating habitat of the Sangai, and thus endangers the survival prospects of the deer.

Popularization Activities

Seeing the present critical juncture where the locals are aiming for more park resources, strict legislation may not be the only means of saving the deer and its habitat. The main emphasis should also be given to the aesthetics, culture, and species val-

Continued on page 9

and yearlings accompanying their mothers. Eleven (11) were solitary animals; there were 7 groups of two animals each and 6 groups of three animals each. It is possible that a certain percentage of animals could have escaped attention by remaining in high grass, though I would not put their number higher than 25% of the total count, considering the fact that we deliberately went low over stands and clumps of high grass as noted earlier, to flush out cryptic sangai.

Though the numbers are not as high as have been assumed by the local authorities, the situation in Keibul Lamjao is certainly better than when I last visited the Park in 1975. there has been a significant increase in the total population; the animals are much less shy than before, the ratio of mature stafs in relation to the total population is far better now than in 1975 when only one mature stag could be seen. Rutting behavior was in evidence not only from the helicopter but during the ground visit the day earlier and from the sightings from Toya Hill on 4/14/95. The strip of cultivated land, Thang Brel Maril (or Yanbi) has now been acquired. cultivation stopped and habitat for sangai recreated. The core area of the National Park forming the main habitat in the sangai, therefore, has become a small but continuous unit rather than the bifurcated one earlier and significantly, therefore, the main population has shifted to the area north of Toya Hill, from the previous area of main concentration north of Pabot Hill. Ishing Kambong grass (*Zizania latifolia*) which is a favorite food of the sangai, is increasing, but the *Phragmites karka* is decreasing. Water hyacinth which had covered the open patches of water in the past, has almost been wiped out by the introduction of weevils by the Agriculture Department of the State, and this has added to the siltation and eutrophication, the extent of which has to be scientifically determined. Another weed, *Sylvania natans*, has taken over the open patches. However, this is the first colonizer of open water and unlike the water hyacinth, it forms the base for the formation phumdi.

After the completion of the Loktak Project in 1983, the water table predictably has become stable and permanently high. This has brought about the change of events which I had suspected in my earlier mentioned report in the JBNHS. Due to the lack of fluctuation in the water table, the phumdi has less opportunity to settle on the ground in the dry season and to derive perhaps nutrients therefrom. According to Mr. H. Tombi Singh, Dean, School of Science, University of Manipur, the phumdi is becoming thinner as I had feared. There must be a continuous study of the phumdi dynamics. If the phumdi is indeed thinning, it is a cause of very grave concern since the entire future of this subspecies would depend upon their ability to remain afloat on the floating morass, which is responsible for having saved the sangai from extinction once its habitat on dry land was destroyed in Manipur.

There is a habitation in the right bank of River Khodrak and which abuts into the eastern portion of the Keibul Lamjao National Park, causing an adverse demographic impact over a certain portion of the Park adjacent to this human settlement. The grass level was lower, the Ishing Kambong was absent and what is more we saw no sangai in that portion of the park and only a very few hog deer. This habitation should be shifted across the river after providing the residents with adequate compensation and an alternate site.

Both Shri S.C. Dey and I feel that next year's count should be done in the first fortnight of February, 1996, when the grass is much lower and that a period of two hours should be assigned for the actual field survey over the park itself. This would enable the counting to be done twice, with perhaps a 15 minute rest in between.

The number of hog deer has increased dramatically since 1975. A very heartening new feature was the keeness of the neighboring communities to protect the sangai and the Keibul Lamjao. Instead of the animosity and confrontation which I noted in 1975, a number of people from the surrounding villages met me and impressed upon me the need to save the animals and its unique habitat. The Sangai Protection Forum consisting of 19 voluntary agencies with 215 members from the surrounding villages, was one such organization. They have public education and awareness programs and assist the forest department in enumeration and protection of the sangai.

Continued from page 8

ues. Villagers should be convinced that the Sangai is of an infinitely greater value to them if kept alive in their natural habitat.

To arouse more public concern and sympathy towards the deer, regular programs of seminars, talks, painting competitions, etc. in sensitive villages are planned and given. The following has resulted from giving the Sangai regular publicity:

A program of publishing series of complaints (Title: *Sangai Complaints*) in the local daily *Hueiyan Lanpao*. In them Sangai seeks human sympathy by narrating all about its life history and the present status. About ten of such requests have appeared every Sunday for a year during 1992.

A follow-up program was a documentary radio serial, 20-24 minute episodes (Title: *Please Save Me*) from All India Radio, Imphal Centre, two days per week during 1993. Thanks should be giveh to Mr. M. Kanan Kumar of the center for his keen interest in producing such a laudable program and because of him the serial became a regular feature. It will be rebroadcasat every year from January-April, the deer's breeding season. Commenting on the program, Manipur Mail (February 4, 1993) said: "...the weekly serial *Eibu Amukta Kanbiyu* (Please Save Me)..... This timely venture of AIR, Imphal can make a great contribution in protecting this graceful Brow-antlered deer (Sangai)." There have been plenty of similar comments. Another documentary on the indigenous birds of Manipur and their preservation was aired on October 5, 1994 (Wildlife Week).

As a way to inculcate conservation education on youngsters and also to include the Sangai in academic curricula, the following books have been published:

Manipurgee Tanglaba Sha-Uchek (Rare Birds and Animals of Manipur). This is a well-illustrated book for children (under 10 years old). It placed first in the State Children Book Competition in 1992. Thanks to the Director of Education (Secondary), Government of Manipur for the publication grant and the free distribution of the book to schools, village clubs, etc.

Sangai (Children's book in Manipuri). This book is designed for ages 9-15. The main emphasis is to describe the structural peculiarities of the deer and its present condition on the floating habitat. It has been entered in the XXVIII National Prize Competition for Children's books, 1994-95.

Sangai Conservation (Manipuri). This book was written to display and popularize the value of the deer among the people of Manipur. This is the only book on the species which describes the Keibul Lamjao National Park, anatomy and morphology, behavior, reproduction, population growth, conservation problems, and the history of wildlife conservation in Manipur. Thanks are given to the Director of Science, Technology, and the Environment, Government of Manipur for a publication grant.

Wildlife in Manipur (English). This is a book for college students. It mainly describes the causes of wildlifle depletion in Manipur, steps for wildlife conservation, rare and endangered animals of Manipur, and special wildlife projects for endangered Sangai.

Results

Primary results of the popularization program so far have been exhaustive talks, discussion, etc. among the people, calling attention to the urgent need for increased protection of the deer and its threatened habitat. Fifteen (15) clubs from the surrounding villages recently joined hands with determination and formed an association "Environment and Sangai Preservation Forum". This organization looks mainly at the overall renovation of the deteriorated condition of Sangai and its habitat.

SURVEY OF THE STATUS OF THE MANIPUR BROW-ANTLERED DEER (*Cervus eldi eldi*, M'Clelland, 1842) IN THE KEIBUL LAMJAO NATIONAL PARK, MANIPUR, APRIL 1995

M.K. Ranjitsinh

An aerial survey of the population of the Manipur brow-antlered deer or Sangai was carried out in the Keibul Lamjao National Park, Manipur on 15.4.1995, together with Shri S.C. Dey, Additional Inspector General of Wildlilfe, Gov. of india and Shri S. Singsit, Chief Wildlife Warden, Gov. of Manipur, from a Chetak helicopter. The actual flying time over the National Park was 50 minutes, which was inadequate to carry out a repeat flight over the Park and to count the animals twice over. In 1975, I had undertaken the first aerial survey of this animal, which was reported in the Journal of the Bombay Natural History Society (JBNHS), when 14 animals had been counted.

We took off at 9:30 a.m. and after reaching the Park, we flew zigzag, flying east to west and back, about 200 ft. above the ground level in transects about 200 to 250 yards wide. Where the grass was high on the "phumdi" (floating morass), we flew lower and slower over such clumps and in closer transects. When we saw any Sangai, we usually went lower and hovered close by to see and identify the individual animal and to assess the number in the group. We also saw about 80 hog deer and two sounders of wild pig. Being smaller animals some of these did indeed escape detection. As regards the Sangai, most of them were not unduly disturbed and some even stopped to look at the helicopter. A number of them, however, did seek shelter in high grass and some even went cryptic.

I counted 43 animals consisting of 15 stags, including 9 mature dark-colored ones, 20 hinds, and 8 fawns

STATUS OF SWAMP DEER IN KAZIRANGA NATIONAL PARK

Bibhab Kumar Talukdar

The conservation of swamp deer (*Cervus duvauceli ranjitsinhi*) has been a subject of various discussions both at the national and international level. The Kaziranga National Park, situated in the alluvial flood plains of Brahmaputra Valley, is one of the potential strongholds of the swamp deer in Assam. A reconnaissance survey in the Kaziranga National Park was initiated to find out the status of the swamp deer and its habitat. The results of the study are documented in this paper.

The Kaziranga National Park (KNP) constitutes an area of 430 sq. km., lies midway between longitude 93°5'E to 93°40'E and latitude 26°30'N to 26°45'N and in the altitude of 40-80 metres above MSL. The park, which is famous worldwide for conserving the endangered Indian one-horned rhino, also harbors a number of threatened mammals of India including Asian buffalo (*Bubalus bubalis*), elephant (*Elaphus maximus*), hoolock gibbon (*Hylobates hoolock*), tiger (*Panthera tigris*), gangetic dolphin (*Platanista gangetica*), and swamp deer (*Cervus duvauceli ranjitsinhi*), as per Lahon and Sonowal (1973).

The conservation of swamp deer (*Cervus duvauceli ranjitsinhi*) has received increasing attention in Assam. The KNP has been providing conducive habitat to the swamp deer and supported the population build-up of the species in the park. The present paper deals mainly with the status of the swamp deer in KNP and the future conservation prospects of the species in the park.

The climate of KNP is typical subtropical monsoon, with an average annual rainfall of ca. 2500 mm. The rainfall occurs mostly from April to September. The annual temperature also has a variation from ca. 8°C in winter to ca. 35°C in summer. The relative humidity ranges from 50-90%. The vegetation of KNP can be divided into four categories as per Champion and Seth (1968):

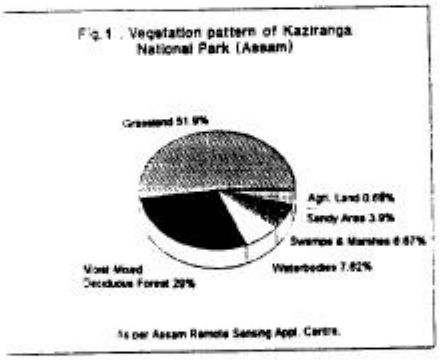
a) Eastern alluvial grassland

b) Low alluvial savannah woodland

c) Seral stages of moist-mixed deciduous forests

d) Tropical semi-evergreen forests

One of the important features of KNP is the presence of numerous waterbodies which are either permanent or semi-permanent. The tree forests of the evergreen type grow more in the eastern part of KNP, while wetland and open grasslands are mainly distributed over the western part of the national park. The detailed land-use pattern of KNP is shown in Figure 1.



Methods

A ground reconnaissance survey was made in the KNP from 1991-1994, where the swamp deer were present. A total of 12 trips were made in the KNP. The official population census of swamp deer in the park was also taken into account in the study. The activity of the swamp deer in the KNP was observed using field binoculars. The viable and important habitat of the swamp deer in the park was identified based mainly on numbers. In addition to the direct observations in the field, information from the local forest staff was also gathered through interviews and discussions.

Results and Discussions

One of the important features of the KNP is the presence of a number of swamps, marshes, and waterbodies, which are either permanent or semi-permanent. These wetlands provide shelters not only to waterbirds alone, but also to the other wetland-dependent mammals like the Great Indian one-horned rhinoceros, water buffalo, and swamp deer. Seasonally inundated grassland is the largest single type of habitat covering around 51.9% of the total area of the National Park. The census figure of the swamp deer at KNP is summarized in Table 1.

The whole KNP has been divided into eight (8) smaller blocks by the managers of KNP for the census. The vegetation type of the eight blocks in KNP is documented in Figure 2. In KNP, the swamp deer prefer to live in the short grasslands near wetland areas. The short grasses such as *Cinodon dactylon*, *Chrysopogon aciculatus*, *Canchrus ciliaris* are used as fodder, while the tall grasses such as *Arundo donax*, *Saccharum spontaneum*, *Phragmites kakra*, and *Erianthus ravaneae* etc. are used for taking shelter. Some of the swamp deer habits have been documented by Prater (1971).

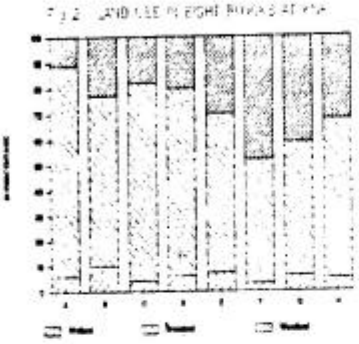
The number of swamp deer recorded in the eight (8) blocks in the successive census at KNP are summarized in Table 2. Parihar and Panigrahy (1993) revealed that the

TABLE 1. The census figure of swamp deer at KNP.

Year	Number of Swamp Deer
1966	213
1972	516
1978	697
1984	756
1991	559
1993	427

Continued from page 11

growth rate of swamp deer in KNP was highest between the year 1966 and 1972. The deer is locally known as "Dal Harina" in Assamese ("Dal" means "in groups", while "harina" stands for "deer"). In KNP, it was observed that



the groups of swamp deer normally consisted of 60-70 deer. However, in March 1991, around eighty (80) swamp deer were seen in a single group in the haldibari block of the park, of which 11 were male, 49 females, and 20 sub-adult swamp deer.

During the study period, it was realized that there seemed to be a relationship between the time selected by the swamp deer to give birth and the annual flood in KNP. The deer in the park were found to give birth from November-December. This is evident from the fact that in Dudhwa National Park, the swamp deer give birth from June to early July. It is believed that the swamp deer in KNP give birth in November-December to ensure that the young will have enough time to withstand the flood during the summer (June-August). The rut for swamp deer begins in April in KNP.

The present study indicates that the concentration of swamp deer is highest in the Bagori block, as this block experienced a continued increase of swamp deer from 1966 to 1991. Since the Bagori block consists of ca. 10% wetlands and ca. 67% grasslands. the area seems most suitable to the swamp deer in KNP. Even the Haldibari block experienced an increase in swamp deer population, while the Kaziranga and Boralimara blocks fluctuate in each census. The population of the deer in the Panbari block increased from 1966 to 1978 but declined in 1984 and 1991, reducing the population to only 39 in 1991. The population of the deer in Bhabani and Charigharia blocks increased from 1966 to 1984 when the population went up to 128 and 108, respectively, but showed a moderate decline in 1991, the population went down to 87 and 17 in the Bhabani and Charigharia blocks, respectively.

The factors associated with the swamp deer population decline in KNP were identified as follows:

a) Devastating flood in 1988 resulted in severe damage to the population. A large number (ca. 300) of swamp deer died due to this flood. The hunters also took the opportunity to kill the swamp deer during the flood when they retreated from the park to the outside to save themselves from the floodwaters. A good number of deer were believed to be killed by hunters during the 1988 flood.

b) The silting in the wetlands of the KNP has resulted in some of the wetlands already changing to grassland.

c) Some of the grassland habitat is transforming to woodlands.

The maintenance of appropriate habitat is the foundation of most wildlife management practices (Thomas, 1979). The viable habitat of the swamp deer in KNP must be conserved to ensure the existence of the species. For that, the proportion of the grasslands and wetlands in the area inhabited by swamp deer must be identified and managed from a conservation point-of-view. Further, long-term monitoring of the habitat and the population status of the swamp deer, and a study of limiting factors in KNP must become an integral part of the conservation measures. Although the swamp deer were found in the Manas National Park of Assam, the present ethno-political disturbances in and around the Manas NP have made the future of the swamp deer very bleak. As such, the KNP is the only stronghold of the swamp deer in Assam. The need for a conservation management plan for the swamp deer in the KNP is urgently required to keep the species alive in the wilderness of Assam.

TABLE 2. Blockwise census figure of swamp deer at KNP from 1966-1991.

BLOCK NAME	YEAR/NUMBER OF SWAMP DEER				
	1966	1972	1978	1984	1991
Bagori (74.30 sq. km)	72	123	145	210	242
Haldibari (48.30 sq. km)	25	54	76	80	84
Kaziranga (44.80 sq. km)	16	72	69	44	65
Panbari (44.55 sq. km)	19	111	129	62	39
Bhabani (72.90 sq. km)	51	66	91	128	87
Charighoria (55.50 sq. km)	19	52	92	108	17
Boralimara (31.10 sq. km)	11	29	10	29	---
Tamulipathar (58.35 sq. km)	---	9	85	95	25

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PHILIPPINE SPOTTED DEER (*Cervus alfredi*) CONSERVATION PROGRAM

William L.R. Oliver

Being the largest, one of the most beautiful, and one of the most endangered species endemic to the West-Central Visayas, the Philippine spotted deer is also one of the most potent symbols for conservation interest in this region. For these reasons, it has been actively promoted as the "flagship species" for the generation of increased interest and resources for relevant research and conservation management activities in the West-Central Visayas, which has many other critically endangered, endemic species. Indeed, according to figures published by the International Council for Bird Preservation (ICBP, 1992) this region is one of the world's ten highest priority areas for conservation concern in terms of both numbers of threatened endemic species represented and degrees of threat. Thus, the "Philippine Spotted Deer Conservation Program (PSDCP)" is not only focused in one of the world's highest priority conservation areas, it has also constituted the principal program in that area since 1990 and it is deliberately designed to generate increased attention and resources for a wide range of related conservation activities (Oliver, 1993).

The program was conceived in 1985 following a wide-ranging field status survey, which revealed that the species was already extinct over at least 95% of its former range, and survived in small numbers on only two islands, Negros and Panay. In 1987, this was followed-up by a faunal survey and development of a management plan for the proposed Panay Mountains National Park (intended to protect the largest and possibly only surviving viable wild population). However, it was not until April 1990 that the program was formally inaugurated under the aegis of a Memorandum of Agreement (MOA) between the Department of Environment and Natural Resources (DENR, Philippines Govt.) and Parc Zoologique et Botanique de la Ville de Mulhouse (Mulhouse Zoo, France). This MOA includes a series of conditions (such as the ownership of all captive stock remaining with the government and people of the Philippines) and novel protocols designed to generate resources for relevant in-country conservation activities from participating international organisations and specialist breeding centers; these protocols having since been adopted by the DENR for all such wildlife research and conservation programs. Other recent developments in this program have included:

a) the creation of three local rescue and captive breeding centers for spotted deer at: the "Center for Studies in Tropical Conservation (CenTrop)" of Silliman University in Dumaguete City, Negros Oriental; the "Negros Forests and Ecological Foundation, Inc. (NFEFI)" in Bacolod City, Negros Occidental; and the "College of Agriculture and Forestry of West Visayas State University (WVSU/CAF)" in Lambunao, Panay;

b) the establishment of two *ex-situ* breeding stocks at the Mulhouse Zoo and the Zoologischer Garten Berlin, Germany; and, hence;

c) the creation of a "World Herd" of captive spotted deer, which has increased by a factor of >350% from 13 (6 males, 7 females, of which 0.3 were captive-bred) in April 1990 to 46 (25.21, of which 9.9 were captive-bred) on December 31, 1994, and now involves an increasing number of leading, international partner institutions committed to providing support for relevant *in-situ* conservation activities;

d) assisting the development of management recommendations for the Panay Mountains National Park (c. 60,000 ha) and several, smaller protected areas;

e) the organization of a series of annual "West Visayas Biodiversity Conservation Workshops", which are aimed primarily at decision makers, as well as numerous invited conference presentations and publications on the program;

f) the production and distribution of education materials, especially the "Only in the Philippines" series of posters (of which over 35,000 copies featuring nine different threatened species or species' groups in four local languages have been distributed to date); and

g) development of a number of similar field research, captive-breeding and education projects for a variety of other critically threatened species endemic to this region, including: Visayan warty pig (*Sus cebifrons*), several endemic fruit bats (*Acerodon* and *Pteropus* spp.), a bushy-tailed cloud rat (*Crateromys heaneyi*.) and various other critically endangered birds endemic to these or the neighboring islands of Cebu, Masbate, and Ticao.

Future priorities for this program include the more effective resourcing of the local breeding and rescue centers (so that these may become more self-sufficient); the continued dispersal (i.e. "breeding loan") of surplus, captive-bred stocks among the growing "World Herd" consortia (thereby also increasing the number of supporting/signatory agencies); and, most importantly, the development of habitat protection and restoration projects (also with a view to the eventual reintroduction of this and other endemic species in these areas). All of these islands in this region have been virtually deforested, but the few remaining patches of habitat still harbour relictual populations of many endemic taxa (including many single-island endemics), as well as other important fauna and flora. Cebu, for example, had no less than eleven endemic species and subspecies of birds, of which at least four are extinct and all of the surviving taxa are critically endangered. The enhanced future protection and management of habitat remnants in this region therefore constitutes the single highest priority of this program. In this crucial

Continued on page 14

Continued from page 13

respect, the conservation of the spotted deer is a means to this end, rather than an isolated objective.

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CALAMIAN DEER (*Cervus calamianensis*) CONSERVATION PROGRAM

William L.R. Oliver

Being the only endemic mammal species, as well as the largest and one of the most threatened animals, to occur in the Calamian Islands, the Calamian deer is similarly regarded as an ideal "flagship" species for promoting applied research, education, community developments, and other biodiversity conservation activities in this globally important region.

As with the spotted deer projects, this approach is central to the "Calamian Deer Conservation Program", which was formally launched on June 11, 1993 by the signing of a new MOA between the DENR and the Zoological Society of San Diego (ZSSD). However, since the program was conceived and had been agreed by the PAWB in late 1991, substantial progress on a number of key elements (and, hence, the terms and conditions of the incipient MOA0) had already been made by that time. These elements, most of which were funded by ZSSD, included: a) a distribution-wide field status survey conducted in February/March 1992 (for details see DSG Newsletter No. 10, 1992); b) the formulation of recommendations for the enhanced future research and management of this species (including those on Calauit Island, some of which have since been implemented by the DENR); c) the presentation/publication and distribution of relevant reports and research papers; d) the production/distribution of 2,000 conservation-education posters featuring this species in the "Only in the Philippines" series; e) the organization and conduct of a number of related projects (e.g., field surveys on wild pigs, mouse deer, fruit bats, and cockatoos elsewhere in the "Palawan faunal region"); and f) production of other conservation posters featuring Palawan endemic (i.e. Palawan peacock pheasant) and non-endemic, but locally important species (i.e., Philippine cockatoo and Philippine crocodile).

Under the terms of the new MOA, the development of a properly structured collaborative breeding program, involving the loan of a founder stock of 15 (6 males, 9 females) deer from Calauit Island Game Preserve and Wildlife Sanctuary (37.4 sq. km) to the ZSSD, was also agreed to. The export of these animals to the USA, via Poswin Quarantine Station in Warsaw, was planned in mid-1994, but had to be postponed (hopefully only until mid-1995) owing to last minute problems concerning an unexpected inspection by the USDA of all recognized (*ex-situ*) quarantine stations (including Powsin) and continued uncertainties about the issue of the US-CITES import permit (which was not finally issued until October 1994). This situation was most unfortunate; not least because the Calamian deer is quite inappropriately included on Appendix I of CITES (i.e. there has been no international trade in this species either prior to its inclusion in 1982, or since that time), and because the CITES was hardly intended to hamper the development of nationally/internationally agreed conservation programs.

By comparison, the relevant governmental authorities in the Philippines, particularly DENR/PAWB, have done everything possible to facilitate this project. Their assistance even included the amendment of a former Presidential Decree to enable the acquisition of the stock from Calauit; facilitating the formal recognition of this conservation program by the Palawan Council for Sustainable Development (PCSD), which recently assumed administrative control of the Calauit Project from the DENR; and by fast-tracking the provision of relevant permits.

In any event, it is important to note that the existing deer population on Calauit cannot possibly be deleteriously impacted by the proposed removal of these 15 founders, since the current annual reproductive rate of the Calauit population is vastly in excess of this number. For example, no less than 40 births were observed during a two-week expedition in late April/early May 1994 by a research team from the Wildlife Biology Laboratory, University of the Philippines at Los Banos (A. Dans, pers. comm.). It is inconceivable that this team observed all the wild deer births that occurred even during this period, which precedes the reported birth peak in this population which usually occurs at the beginning of the rainy season in June. Moreover, births have also been recorded on Calauit in all months of the year (J. Gapus, pers. comm.).

Following a request from the PAWB, the UPLB team also conducted a new census of the Calauit deer population. At the last census count (December 1991) this population was reported by the Conservation Resources Management Foundation (the former administrating NGO), to number c. 550 individuals. Analysis of the CRMF annual census figures over the preceding 14 years also indicated an average (but declining) annual growth rate in this population of 22% (Oliver and Villamore, 1992); thereby indicating an expected population of between 750 and 800 individuals by December 1993. However, in April 1994, the UPLB team estimated the Calamian deer popoulation to number c. 1,123 (± 236) individuals (Orig and Rosell, 1994).

These data indicate that the deer population on Calauit is a somewhat

Continued on page 15

Continued from page 16

larger population than previously supposed, though the UPLB results are not comparable with those of the CRMF because the census methods differ. It is also not known if the deer population is still increasing in size, though this seems likely. Even so, this species remains far from securely established, particularly given the continuing and steadily increasing threat imposed by the "*Balik* Calauit Movement" (BLK), which has illegally re-assumed control of a growing proportion of the Island. In addition, there is no doubt that this species remains seriously (perhaps even critically) threatened throughout the remainder of its minuscule range in the Calamian Islands (Oliver and Villamor, 1992; Oliver, 1993). For all of these reasons, the species' status category designation in the latest edition of the *IUCN Red List of Threatened Animals* (IUCN, 1994) was downgraded from "Vulnerable" to "Endangered".

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IN THE "LOST WORLD" OF VU QUANG

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Associate Editor
WWF Features

(reprinted from World Wide Fund for Nature *Features*, May-June 1994 issue)

"Scientists have described Vietnam's Vu Quang Reserve as a "lost world". It has largely escaped the ravages of war, and is now yielding its secrets to scientists."

"A new genus of mammal has been discovered, as well as a new species of muntjac (barking deer) and a new carp species. A mysterious skull, found in a villager's house, could prove yet to be another new species."

We made our way across the boulder-strewn river very carefully. Several times I slipped and fell into the icy waters. Luckily the river was not deep. Once across, we climbed the slippery, steep hill, clutching at tree branches as we go along.

At 600 m, the slope became gentler. We trekked for 6 KM more, stopping occasionally to catch our breath and remove leeches from our shoes. The forest was filled with these bloodthirsty creatures, and they seemed to especially like the two Americans in our group. They must be Viet Cong leeches, we joked.

We were now in the "lost world" of the Vu Quang Nature Reserve. It is the territory of the *sao la*, a goat-like animal, which scientists says is more akin to the ox-hence its common English name, the Vu Quang ox. *Sao la* is the local indigenous name meaning "weaving spindle" because its horns resemble these long wooden implements.

This shy, nocturnal animal was unknown to the outside world until scientists from WWF and the Vietnamese Ministry of Forestry (MOF) stumbled upon its skulls in villagers' homes during their first foray into this remote corner of Vietnam in May 1992.

That mission also found a new river carp species, the fourth in the *Opsarichthys* genus. More recently, in March 1994, the scientists discovered another new large mammal species, this time related to the common barking deer. They found only the skulls of the animal, which they have called the Giant muntjac (*Megamuntiacus vuquangensis*), since it is almost twice the size of the largest known muntjac, the Indian muntjac.

These discoveries have brought worldwide attention to the reserve, described by some scientists as a "lost world seemingly untouched by the war" and possibly teeming with new species. Skin and hair from a mystery skull found in the adjacent Pu Mat forest are currently being examined, and could reveal yet another new mammal species.

But scientists are worried that these new discoveries could become extinct even before they have had a chance to study them. WWF is currently undertaking a photo-trapping survey, using automatic cameras connected to pressure pads. When an animal steps on the pad, it triggers the camera, thereby photographing itself.

Since November 1993, WWF project executant Shanthini Dawson has been gathering data on the *sao la*, from both field surveys and interviews with villagers, in the hope of drawing up a conservation plan for the species. It was during one of these visits to local villages when Do Tuoc, an MOF field biologist and Ms. Dawson's local counterpart, drew her attention to the skulls of the Giant muntjac.

Ms. Dawson, who later had a fleeting glimpse of a live Giant muntjac, fears that pressure from hunting could drive the species to extinction. "It would be tragic if these species, having survived 30 years of war, become extinct now because of hunting", she said.

There are over 20,000 people living in and around the Vu Quang reserve. Although most farm crops such as sugar cane, they supplement their income with hunting. They mainly hunt

wild pigs and the common muntjac, with the Giant muntjac coming in a close third. Occasionally, a *sao la* would walk into their traps.

The people eat the meat of both animals. In addition, the teeth of the *sao la* and the skull of the Giant muntjac are ground for use as medicine. Since their discoveries made global headlines, both species have gained immense monetary value, dead or alive.

Dr. John MacKinnon, who co-led the first expedition, said that the publicity about the new species is creating interest among animal collectors and trophy hunters. "A few local institutions have already paid money for specimens alerting local hunters to the potential monetary value of the animals", he said.

In the last hunting season, from September 1993 to February 1994, about 4,000 snares were set in the reserve. Between July 1993 and January, 1994, local villagers reportedly caught 15 to 20 Giant muntjacs and 3 *sao las*.

Alarmed by this pressure, the Ministry of Forestry has recently imposed a hunting ban but this has largely been ignored. To counter this threat, guard posts are being set up in the reserve.

In addition, at the November meeting of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), Vietnam will present the proposals for listing the *sao la* and the Giant muntjac in the Convention's Appendix I, meaning all trade in the species is prohibited. This will be the first CITES meeting Vietnam will attend as a member. It joined the Convention early this year.

Public education is also very important, says Pham Mong Giao, senior scientist with the Ministry of Forestry, and a frequent visitor to Vu Quang. "Nature conservation is still new here", he said.

Mr. Giao believes that it is easier to spot the *sao la* in the bigger and less disturbed forests of the proposed Pu Mat reserve, adajacent to Vu Quang's northwest border. When approved, the 100,000 ha Pu Mat reserve would, together with Vu Quang, form a sizeable forest complex.

A major concern, however, is to improve local living standards. Vu Vun Dung, chief botanist at the Forest Inventory and Planning Institute, and co-leader of the first survey mission, is keen to introduce farming of the sika deer, *Cervus nippon*.

The deer is bred for the velvet of its antler, which is used in traditional medicine to treat blood disorders and anemia. Research in the former Soviet Union has shown that it contains a substance called pantocrin, which clinical trials have proven to be useful as a tonic and for accelerating the healing of wounds and ulcers.

In Vietnam, the antler is sold for as much as 30 million dong (US $3,000) per kg. The live deer itself is also worth a lot. A young male deer fetches around 6 million dong (US $600) while a female much more-about 30 million dong. Prices are increasing almost everyday, with a female deer now fetching as much as 80 million dong (US $8,000).

In villages like Duc Loc, a stone's throw from Vu Quang, deer farming is popular. Visiting Nguyen Van Ngo, who makes his living solely from deer farming, one can see why. Mr. Ngo's house boasts a television set, a refrigerator, and a stereo set-luxury items in a poor country. His house, a stone bungalow with tiled roof, stands in contrast to the small thatch huts in Vu Quang.

Mr. Ngo started deer farming in 1985 with one male deer. Today he has two, a male and a female. The female deer he acquired in 1988 has already produced three offsprings, all of which Mr. Ngo has sold. Mr. Ngo says deer farming is easy and doesn't take much space.

Vu Quang villagers are very keen to start deer farming, but many are not able to raise the capital. So other livelihood projects are being developed. This includes government-sponsored rubber and cinnamon plantations outside the reserve. These plantations are expected to create employment for the local communities and will hopefully absorb the 130 or so workers of the now-defunct Vu Quang Forest Enterprise.

WWF is hoping to turn some of these former destroyers of the forests into their guardians. "With their knowledge of the forest, these people are well-placed to protect it", said David Hulse, WWF Vietnam Country Representative. "But it will take time to change their thinking."

It was time for us to change tracks too. After spending a wet day in Vu Quang's mist-shrouded forest, finding only footprints of gaurs, foraging sites of wild pigs, and civet droppings, but no sign of *sao la*, we headed back for the reserve's temporary research camp. As we gingerly make our way down the hill, often sliding down the rain-soaked paths, we hope there is still time to save Vu Quang and its newly and yet-to-be discovered biological riches.

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