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Edited by
Richard D. Estes, Co-chairman
5 Granite Street
Peterborough, NH 03458 USA

Tel/Fax (603) 924-9804
Email estes@top.monad.net

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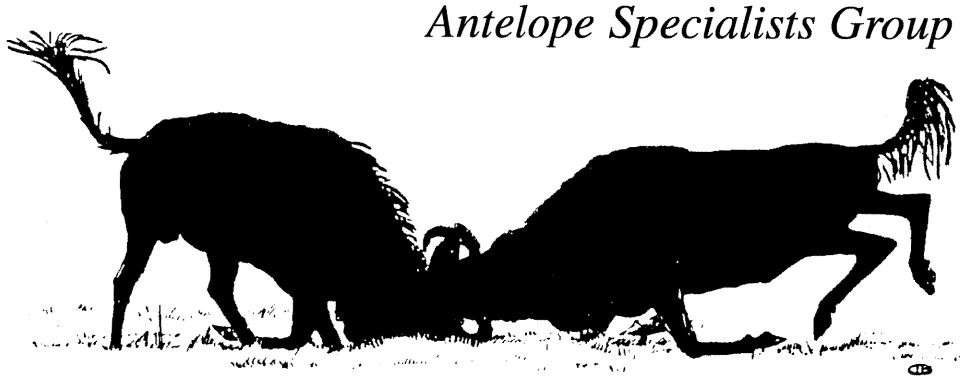
Antelope Specialists Group



GNUSLETTER

ASG News

BILL GASAWAY 1943–1998

The career of this dedicated wildlife researcher/conservationist was cut short on 15 July. His wife, Kathy, submitted the following obituary at my request:

Born October 1943 in Michigan.
Since age 5 wanted to go to Alaska.
BS Wildlife Biology, MI State Univ., 1965
MS Zoology, Washington State Univ., 1967
Ph.D. Zoophysiology, Univ. of Alaska, 1974
Drafted to Army 1967 (not combat; ended up at toxicology lab)

Alaska Dept. of Fish and Game (ADFG), 1972–1990, as a moose research biologist (I like to think of him as a moose research ecologist).

Before he finished his Ph.D., he had developed an interest in Africa, and in fact his motivation for finishing his Ph.D. was to work in Africa. He was working on a few options for Africa when ADGF offered him employment. But he still had a hankering for Africa, and he and his former wife made several visits over the years to both East and Southern Africa. He decided he wanted to retire in Africa.

In 1986, Bill and I had the opportunity to "test" Africa. Bill was hired by the South West African/Namibian government to investigate spotted hyena predation of plains zebra at Etosha National Park. (I quit my job with National Park Service, but Bill was able to take a leave from ADFG). We loved it.

In 1989 we returned to Etosha, this time to develop a springbok survey technique. (Environmental conditions did not allow us to test the method, so this has not been published but was submitted to the Namibian government.) Africa (Southern Cross Fever) was in our blood.

Bill qualified for early retirement from ADFG in 1990, freeing us to return to Africa 1991–94, again to Etosha, to investigate limiting factors of plains ungulate populations. Despite the negative experience (project cut short, permit renewal denied), Africa was still in our blood.

Visiting faculty member or professor at Colorado State University 1996–97.

We were building our retirement home near Moab, Utah, and still writing up the Etosha stuff—and looking for a way to get back to Africa—when Bill was diagnosed with advanced pancreatic cancer in April 1998. He died in July.

This year the 20th Alaska Legislature formally acknowledged Bill's many contributions to wildlife management in Alaska and throughout the world.

In this issue...

ASG News **1**
Bill Gasaway **1**
Steve Shurter taking up new post **2**

Antelope News **2**
Arabian oryx crisis in Oman, Andrew Spalton **2**
Report of the Hirola Task Force **2**
DNA tests show Roosevelt sable not endangered, Rolf Baldus **5**
Antelope data base created by Rod East **7**

Regional Rundown **7**
Congo Republic: Commmunity conservation in a hunting concession, Eric Stockenstroom **7**
Senegal: Status of the Mhorr gazelle, Mark Schulman **9**
Algeria: Edmi gazelle in Mergueb Nature Reserve, M. Sellami **9**
Tunisia: Scimitar-horned oryx to be placed in Sidi Toui NP, Simon Wakefield, Renata Molcanov **9**
Sudan: Endangered wildlife of Eastern Sudan, Ibrahim M. Hashim **11**
Ethiopia: Swayne's hartebeest, Antelope TAG Antelope digest ... **15**
Botswana: Setting the record straight, Rod East **15**
Mongolia: Massive die-off of Mongolian gazelles infected with foot rot, G.B. Schaller, Badamjavin Lhagvasuren **15**

ASG News *continued*

Steve Shurter Takes Up New Post

Chair of the AZA Antelope Taxon Advisory Group (TAG) and valued member of the ASG, Steve will be leaving White Oak Plantation for a new position as described in a 20 Jan 99 e-mail.

"This is to announce my acceptance of a position with the Peace River Refuge as Director of Conservation. The Peace River Refuge is a recently formed private initiative located near Port Charlotte, Florida, on a 4,500 acre tract along the Peace River. The focus of the facility will include captive breeding, research and conservation programs with a strong representation of captive ungulates including rhinos, tapirs and antelopes.

As the facility grows, it is planned to initiate cooperative relationships and participation in regional and international conservation programs and organizations. This will include my continued association with the Antelope Specialist Group, the AZA and the Antelope, Tapir and Cattle TAGs, and the various SSPs with which we hope to work closely.

My final day at White Oak Conservation Center will be the 15th of February. Until a decision is made regarding my replacement, please contact John Lukas, General Director, or Dave Thompson, Director of Conservation, with any business related to White Oak.

My apologies for the general announcement and I hope to get the chance to speak to many of you on an individual basis in the coming weeks."

The following office address can be used after the 15th of February. New e-mail and phone/fax numbers will be forwarded at that time.

Steve Shurter
Director of Conservation
Peace River Refuge
4300 SW County Road 769
Arcadia, FL 34266

Antelope News

Arabian Oryx

Crisis in Oman

28 Jan 99

Andrew Spalton (ASG) e-mailed some really disheartening news to IUCN hq. in Gland: "You will probably have heard that the oryx project is in dire straits. Poaching over three years has reduced the wild population from over 400 to less than 70. Live trade to the UAE [United Arab Emirates] is the root cause. We have rescued females from the wild to form a breeding herd for future reintroduction if their security in the wild can be guaranteed. It's nothing less than a disaster, and we will be reporting on it at the forthcoming Arabian Oryx Conference in Abu Dhabi which we are trying to ensure will address the trade issue. There is going to be a strong regional presence as well as many guests from the "oryx world" elsewhere. Claude Martin will lead the WWF delegation. Do you know if IUCN Gland will be represented? The Veterinary and the Reintroduction Specialist Groups will be represented." [By Michael Woodford[ASG] and Micky Soorae, respectively. —Ed]

Commentary

This apropos comment was received last October from an unnamed respondent to an inquiry about recent capture operations of endemic Somalia antelopes and export to certain United Arab Emirates (still waiting for documentation).—Ed.

"What is needed in this part of the world is more education/awareness. Many of the top people have these private collections and naively believe they are helping wildlife/conservation. Instead, they are fueling a trade with a massive mortality to collect some rarities that are mismanaged and sooner or later killed through ignorance. The top people are too often surrounded by ignorant and corrupt middlemen who care about money rather than animals."

The Report of the Hirola Task Force

The Report of the Hirola Task Force, published in April 1998 includes a summary of the translocation to Tsavo East NP (Operation Hirola) and an appendix providing detailed translocation and post-release monitoring reports. Information that was unavailable when the *Gnusletter* accounts were published (vol. 15(2) & 16 (1) indicates that there was justification for darting animals from a helicopter despite the known mortality risks and their abrupt release in Tsavo.

The report also includes the summary and recommendations of Chris Magin's[ASG] Hirola Recovery Plan, but there is no mention of the fact that the ASG secured the funds that paid for preparation of the document. This is the second time the Hirola Task Force has failed to give proper acknowledgement to the Antelope Specialist Group.

Translocation

A sub-committee of the main Hirola Task Force planned, organized and implemented the translocation in August 1996.

The operation involved over 50 people in the field, mainly KWS [Kenya Wildlife Service] employees and numerous others in Nairobi, many working on a voluntary basis. Preparations took many months with many necessary procurement and complex logistics to be organized in this remote and logistically difficult area. By August 1996, the team was in place. The area was dry and very hot. Temperatures in the shade were 30° C by mid-morning. The terrain was flat and dominated by a thorny scrubland-type vegetation with a lot of livestock and a few wild animals grazing together on the occasional patch of grassland. People and hirola are inextricably linked and the local pastoral Somalis are very aware and reasonably tolerant of the animal. There

was interest in the HTF's activities by the local community and previous efforts to establish a good relationship seemed to have paid off. The team was made welcome at Ijara, which was the centre for operations.

Weeks of aerial survey work in the area by the KWS Airwing paid dividends with all the main hirola groups located prior to the first nets being placed. The netting was initially supervised by colleagues from southern parks in South Africa who are experienced in the capture of hartebeest. Their input proved invaluable and the Task Force is indebted to them. They left after a few days with a new species to add to their CV.

Netting is a slow process, and it took two days to set up the nets in a suitable location. But as luck would have it, the herd came within a few kilometers of the nets the very next day, and the skilled and difficult process of herding them by helicopter through thick scrubland began. Because of the difficult nature of the task and the sensitivity of the animals themselves, the capture team had to lie in wait in the area of the nets and could not even relieve themselves for fear that the smell would scare the animals away. When the animals eventually arrived at the capture site, there was a brief panic as the first individuals became entangled in the nets. The capture team had to move quickly to restrain the animals by the horns while the vets, scientists and technicians injected calming drugs, took samples and measurements, and readied the animals for their journey to Tsavo.

After the capture, the animals were loaded onto vehicles and driven through freshly cut tracks to the newly constructed airstrip built specially for the translocation. Local Somalis helped to transfer the unique passengers from the vehicle to a Cessna Caravan. It took one hour to deliver the first herd of 11 hirola to Mukwaju in Tsavo East.

On arrival in Tsavo, the animals were placed in specially constructed bomas, where they underwent careful observation by vets, rangers and others over the next few days.

Just as the operation seemed destined for a successful conclusion, the capture was compromised by events that were out of the team's control. A court injunction claimed that the operation was spraying noxious chemicals and their persecuted wildlife was being stolen from them, an accusation that amused local Somalis as it did the team! Members of the team had to return to Nairobi to go to court with KWS legal affairs personnel to defend their position. Fortunately, the political motives of the injunction were quickly uncovered, and the move denounced as baseless by the court. But the damage had been done, and the media coverage that the case inspired led to intense pressure in the field. Sadly, the team's good relations with the local people deteriorated as politics entered the debate.

The team continued its work against considerable constraints. In order to accelerate the translocation, it was decided to dart the animals from the helicopter (contrary to the agreed protocols) to try to keep herd groups together for release. No blame should be placed on the team as this decision was taken under critical circumstances and indeed was successful in bringing up the numbers of animals captured. Unfortunately, concerns over the risks of darting were borne out by a higher proportion of mortalities after translocation among these more stressed individuals.

The operation was completed but the last few animals literally had to be flown out by helicopter as ground transportation had been threatened with violent intervention by certain politically motivated groups. The only positive aspect of all the publicity was that suddenly this enigmatic creature was known throughout Kenya and its story was splashed across the newspapers of the world. Even the local pastoralists for the first time realized they had something valuable, something that could benefit them instead of merely providing meat for the administration police and suppliers of the refugee camps.

It is hoped that the translocation will have a positive long-term impact on the Tsavo East population. From births in Tsavo to an increase in knowledge about the species itself, the operation has gone some way in helping to ensure the survival of this little-known antelope.

POST-RELEASE MONITORING

An updated analysis of animal movements, location, herding, effects of collaring and calf survival in Tsavo.

The main purpose of monitoring is to identify any problems that the translocated population is likely to face in its new environment while establishing itself, so that future management plans can be improved in order to increase their chances of success and reduce unnecessary financial costs (Stanley Price, 1991).

A total of 30 translocated hirola were released in Tsavo National Park August 1996, from Ijara Division of Garissa District. The full report given in the appendices attempts to describe elements of movement and/or dispersal, interactions with existing herds, general behavior in the new range, factors of mortality like predation and reproduction of both newly translocated and resident hirola.

Following are the major conclusions from the study so far:

Reproduction, mortalities and population growth

It is clear that hirola have the potential to reproduce and increase in number by over 22 individuals per year currently in a population numbering approximately 70 individuals. It is also evident that predation is playing a large role in limiting the growth of the population. Predators in the area include lion, cheetah and hyena. Efforts to collect and analyze scats of predators have been hampered by low encounter of predators and a lack of scats around the sighting area. It would be useful to collar a few of the main predators in order to monitor their movements in relation to the hirola and to improve the collection of scats to provide reliable evidence on which predators prey on hirola. The possibilities of a fenced, predator-proof sanctuary should also be considered so that losses not related to predators can be ascertained.

Antelope News *continued*

Movement, home range and habitat

Information on vegetation within home ranges has already been collected and is undergoing analysis. Additional information on vegetation in the concentration feeding areas will ascertain why the animals use certain areas at certain times and leave them at other times of the year. Binoculars and a telescope have been acquired and are being used to identify individual males and females in order to relate their location to the total area needed by a herd. The overall home range size is now over 40 sq. km for one widely moving herd.

Animal numbers and movement

It is worth investigating the origin of a herd. Initial studies indicate that subadults can move out of established herds and regroup to form a new herd. It is worth investigating further when and at what age a subadult leaves a resident herd and how far it wanders from it. This information will come out clearly once the current individual identification exercise is completed.

Collars

Results indicate that collars and/or tags had no effect on predation or mortality. The observed mortalities may be a result of injuries and/or stress caused during the capture and translocation. The theory is supported by the fact that six animals died in the boma prior to release.

Calf mortality

Results also indicate that half of the calves born since the capture have died. All the calves born to translocated females died within one month of their birth. This could be because the mothers were still not yet settled in their new environment. Another factor is that resident hirola, although settled in the environment, lost 37% of their calves. This indicates that there are other factors causing mortalities among hirola calves.

Behavioral traits

A near-calving hirola separates herself from the herd to calve. She does not rejoin the herd until a week or more after the birth. Newly born hirola calves lie resting either in tall grass or under a bush close to the mother. When the mother senses danger, she goes for the calf and they move off ahead of the other herd members. When she stops, the calf immediately hides nearby. If the herd is followed further, the adults, including the mother, will often run off and leave the calf behind. The mother soon comes back to check on the calf.

As the calf grows and starts grazing, it stays with its mother and moves together with the herd. At 10–12 months, the young animal starts separating from the mother. It eventually moves away from the herd completely to join groups of Grant's gazelle. These young animals sometimes link up and form a herd of up to three, which moves either alone, with Grant's gazelle or with lone adult males. The young animals have also been observed on their own.

At the mature age of 2–3 years, the males form temporary bachelor herds, while the females join stable nursery herds or lone males. Further observations are still being made on these behavioral phenomena. These small groups are more at risk of predation.

Conclusions and Recommendations

The translocation operation achieved its objectives and demonstrated improved feasibility for utilizing this management technique for hirola (of all ages and sexes). It also showed the suitability of the technology and methodology employed by this particular team and its competence for further translocation operations.

Losses were predicted but the figures compared well to past translocations. In addition, the losses would have been less had the team not been pressured to change its protocols due to the unfortunate political debate and the real threat to personnel safety. Despite this, a good number of animals survive in Tsavo to inject needed fresh genes into the local hirola population, and considerable knowledge on the management of this species has been and continues to be gained.

From the scientific point of view it has been established that:

- the hirola is a grazer which is adapted to arid conditions;
- it is phylogenetically distinct, which has been a matter of debate for decades;
- it is not suffering from any chronic disease and has not been affected by rinderpest which devastated Tsavo recently. The causes for decline are most probably due to other factors such as predation;
- it has numerous intriguing ecological and behavioral traits, which may impact its survival and conservation management.

The operation also served to underline the troubled history of the hirola's native habitat, and the continuing impact of poachers on the species. The importance of livestock and the accompanying pressure on scarce water resources must also have had a negative impact on the hirola. The team also encountered reports that the Administration Police are involved in poaching of the hirola for fresh meat.

In addition, a less costly, more people-efficient operation could be launched from the experience of this operation. The operation encountered further difficulties in boma management, and is now considering a new boma design for future translocations. It may be necessary to confine a few hirola to a sanctuary so that the exact fate of calves from birth to maturity can be determined. The observed losses have been linked to predation and disease, both of which could be better monitored under sanctuary conditions. The situation to date indicates high losses with "hard" releases into a natural ecosystem. It would be interesting to test the sanctuary policy, perhaps on private land with a small number of animals. This would also have other far-reaching implications for the research and conservation of the species.

The Eastern Tanzanian Sable Antelope Is *Roosevelti*

Rolf D. Baldus *ASG*

Background

The remaining population of *Hippotragus niger roosevelti* in Kenya's Shimba

Hills National Reserve consists nowadays of approximately 120 animals. This makes it one of the rarest antelope subspecies in the world. However, there has been much debate whether all sable antelopes in Eastern Tanzania might belong to the same subspecies.

So far they have been officially recognized as *H.n.kirkii*. But there were other voices on the issue. A. Hecker (verb. comm.), one of the early lecturers at the College of Wildlife Management, Mweka, Tanzania, reported in the mid-sixties that he regarded all the sable from Tanga to the Selous Game Reserve and the Kilombero Valley in the West as *roosevelti*. A. Rodgers (*Gnusletter*, September 1987) shares this view. Dollinger (*Gnusletter*, January 1988) and G.R. Fox (1991) define the local populations around Tanga and Saadani as *roosevelti*. R.D. Estes (*Gnusletter*, May 1987) also regards their existence as possible. In this case, *roosevelti* would not be restricted to the nominate population in the Shimba Hills. Consequently they would not be as endangered as previously assumed.

The Project

Wildlife conservation support to Protected Areas and community-based management of natural resources has been a priority in Tanzanian-German development cooperation since 1987. Monitoring of wildlife populations and trends has been a part of these programmes (Baldus 1993; IUCN/SSC ASG-Report 1997). After some initial (1991) German assistance to the Saadani Game Reserve (north of Bagamoyo, along the Indian Ocean coast) a Technical Cooperation project started in 1997 in collaboration with the Wildlife Division. Prior to this the Tanzanian Government had acquired the formerly private Southern Mkwaja cattle ranch and annexed it to Saadani Game Reserve, thereby doubling its size to over 500 sq. km.

In order to assess the conservation value of the protected area, the taxonomic status of the local sable population was regarded as important (Siege and Baldus 1997). The Tanzanian Wildlife Division and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), the German bilateral development agency, therefore asked the Berlin-based Institute for Zoo Biology and Wildlife Research (IZW) to conduct a study. The scientists responsible for the study were R.R. Hofmann[ASG], C. Pitra and D. Lieckfeldt.

Due to the generous support of R. Kock (KWS Veterinary Unit) it was possible for the first time to collect tissue samples of the nominated *H.n.roosevelti* for analysis. For comparison, samples were also included from the sable antelope of the Selous Game Reserve.

Results

The results of the analysis (R.R. Hofmann, C. Pitra, and D. Lieckfeldt 1998) are summarized by the authors as follows:

"The phylogenetic and AMOVA-analysis of complete nucleotide-sequences of the mitochondrial (mt) cytochrome b gene (1140 bp) and the control region (1083 bp) of individuals from Shimba Hills NR (n=2) Saadani GR (n=1) and Selous GR (n=4) resulted in the conclusion that the population is highly differentiated approximately along the 38th [degree] longitude. The Usambara Mountains and large rivers like Pangani and Rufiji obviously act as geographic barriers to genetic differentiation of the sable antelope. Although the molecular data hint at genetic "isolation by distance," the medium genetic distance of 1.2 +/–0.8% between the analysed local populations is too small to justify a taxonomic difference between the nominate *H.n. roosevelti* in Shimba Hills NR and populations in Eastern Tanzania at subspecies level. Interspecific *Hippotragus-Oryx* comparison gives a medium mtDNA sequence difference of 18.1 +/–0.7 %. The preliminary results of mtDNA analysis tend to support the assumption of a formerly continuous distribution of East African *roosevelti* from Southeast Kenya to the Selous in Southern Tanzania, as already indicated by Roosevelt and Heller (1922) and verified by Groves (1983) on the basis of morphometric studies."

Numbers and Protective Status

Saadani and Selous Game Reserves have been the subject of regular aerial counts in recent years (conducted by Tanzania Wildlife Conservation Monitoring/ Frankfurt Zoological Society). However, it is difficult to count sable reliably in this way and normally numbers are underestimated. Ground counts are not possible from a practical point of view, at least in the Selous, as sable roam both inside and outside the reserve, an area of well over 70,000 sq. km.

According to the latest aerial survey of October 1998, the Selous Game Reserve has about 3,900 sable. Outside the reserve, in particular in the South-East towards the Mocambique border, the count resulted in approximately 6,700 sable. How reliable the latter figure is has to be the subject of further analysis and ground counts. Around Saadani the population is estimated to be in the range of 100 to 200. Aerial surveys gave figures of 25 (Oct. 1991), 145 (May 1992) and 56 (Oct. 1998). Siege (verb. comm.) reports that in the mid-eighties he saw more than 100 different sable there on a single day. Up to the early 1990s, there were repeated reports in Tanga of a small herd of sable near Horo Horo on the border between Tanzania and Kenya (Ndunguru and Siege, verb. comm.).

Therefore, the total size of the [*roosevelti* subspecies] population can conservatively be estimated at more than 4,000 individuals, and probably considerably more, instead of the former 120 (Shimba Hills only).

The sable in the Saadani ecosystem live mainly outside the protected area, but also on Mkwaja South which now belongs to Saadani Game Reserve. They have not legally been hunted on licence in recent years. There is, however, considerable commercial and subsistence meat poaching going on in the area, and it is known that sable are also being killed illegally. Credit for the protection of sable in recent years is mainly due to the management of the Mkwaja Ranch, in particular to the Fox family and to Dr. J. Goebel. The decision of the Tanzanian Government to expand the protected area and possibly convert it into a National Park will assist the population in the long run.

Since the second half of 1998, the Tan-

Antelope News *continued*

zanian-German "Saadani Conservation and Development Program" has stepped up its conservation efforts. It will, however, take another few months for the measures taken to become effective and for the protective status of the sable and other wildlife to be improved.

In the Selous, poaching has been greatly reduced since 1989/90 and it is safe to say that sable inside the protected area do not suffer from poaching pressure for the time being. The protective status in buffer zones, in particular south of the reserve, has also been improved due to community based wildlife schemes. In the Selous Game Reserve sable can be hunted (70-80 animals/year) by foreign safari hunters on the basis of a controlled quota as part of the management of the reserve and in order to finance the conservation efforts for an area of approximately 50,000 sq. km.

Further Action

The next step in the research programme will be the identification of the southern and western distribution limits of *roosevelti*. The hypothesis is that sable in Central and Western Tanzania are a different subspecies. A good number of samples have been collected from safari hunting companies which have generously supported the research whenever they were requested. These samples are presently being analyzed and concrete results are expected in the near future. DNA analysis of the first three samples from Kigosi, Ugalla and Kizigo in western Tanzania produced a clearly different result which indicates that these sable are not the *roosevelti* of the eastern population. IZW plans to exchange results with other scientists who are working on sable antelopes.

As *roosevelti* is demographically highly fragmented, overutilization of small local populations will lead to a loss of genetic diversity of the subspecies. It is important therefore to identify the limits of distribution further and increase the protective status of isolated sable herds.

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Dr. Rolf D. Baldus, PO Box 1519, Dar Es Salaam, Tanzania. e-mail: scp@scp.africaonline.co.tz is a staff member of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and works as Government Advisor on Community Wildlife Management in Dar es Salaam. He is also the coordinator of the Saadani Conservation and Development Programme. From 1987 to 1993 he was responsible for the Selous Conservation Programme in Tanzania.

African Antelope Database

ASG Co-chairman Rod East keeps churning out more and more data about antelopes. In a recent e-mail, he gives notice of his latest contribution.

"Over the last 12 months or so I have been preparing the *African Antelope Database 1998*. This extends the information included in the *Antelope Survey Updates* to cover all antelope species (plus giraffe, okapi, water chevrotain and buffalo) in all countries of sub-Saharan Africa. I have produced it in response to the many requests I have received for information on the overall status of antelope species, rather than the reports on selected countries which have appeared in the *Updates* and *Gnusletter*. I expect to be mailing copies of the database out later this month."

Dr. Rod East
Director of Operations,
NIWA (National Institute of Water & Atmospheric Research)
Gate 10 Silverdale Rd.
Box 11-115, Hamilton, New Zealand
Phone: +64-7-856 7026
Fax: +64-7-856 0247
e-mail: r.east@niwa.cri.nz
Web: http://www.niwa.cri.nz

Regional Rundown

CONGO REPUBLIC

Eric Stockenstroom, who has a hunting concession in the CR, attended the December 1997 ASG meeting in Pretoria, where he described the impact of the civil war on wildlife conservation and sport hunting, as reported in *Gnusletter* 16(2). In the following article, Stockenstroom details how he has worked with the local population to produce a sustainable system that meets the needs of the locals for bush meat and sporthunters' needs for trophies.

Thanks to Andre DeGeorges, Manager of Safari Club International's Africa office, for sending the article to *Gnusletter*, along with valuable reports on SCI conservation evaluations and projects in Tanzania and Botswana. Excerpts may be reported in later *Gnusletter*s.

[One slight problem: There is no key for the abbreviations in Eric's proposal. One that I recognize is WCS, the Wildlife Conservation Society.—Ed.]

Andre DeGeorges' cover letter

Date: January 10, 1999

Attached is a description of the Congo Model written by Eric Stockenstroom of Congo Safaris. Eric has gone from a heavily poached area within three years to an area where people have seen as many as 50 bongo per week (actual animal—not tracks), when in most places hunters only see fresh tracks which they must follow. Most community conservation programs linked to hunting take a very simplistic approach to a very complex problem. They assume that meat and money will change people's attitudes. Cultural and religious ties such as "Traditional Hunting" are ignored by ignorant Westerners. The following is an example of an African Solution to an African Problem. Look at this closely—Eric is on the cutting edge of where these community programs need to be going. Among other things, people are encouraged to hunt with shotguns over non-selective snares which kill valuable species such as bongo, buffalo and giant forest hog, as well as ecologically important species such as gorilla and chimpanzee.

As with the Botswana model, this model should be looked at very closely by safari operators, governments and conservation NGOs working in and around Africa's hunting areas.

One of the beauties of this model is that it was undertaken without years of study, hordes of experts and hundreds of thousands of dollars. It is based on common sense and consensus building between Eric and the other stakeholders. This is a real success story.

Proposal for an Adaptive Controlled Village Subsistence Hunting Program for Kabo and Pokola Within the TSH Area

Background

In 1995, a tourist safari hunting program was initialized in the Kabo, UFA—Northern Congo. An important component of this program was to identify a zonal structure which took account of the protein needs of the main logging community in Kabo, while attempting to contain the resulting impact on the overall wildlife population of the Kabo UFA. This has been largely achieved through cooperation between the Kabo community, logging company management and Congo Safaris and the application of a benefit sharing program between CS and the Kabo community.

Certain criteria were agreed to, including:

- A clear division between the safari area and the subsistence hunting area
- No hunting of certain species, either protected (e.g., elephant, gorilla, chimpanzee, leopard) or of value as a safari species (e.g., bongo, giant forest hog, buffalo)
- No export of bushmeat
- No hunting with snares—shotguns only

It is the general consensus that wildlife in the Kabo subsistence hunting area has increased as a result of a decrease in exported wildlife products and the application of shotgun hunting (vs. snaring as the main hunting method). It is also clear that there has been a dramatic improvement in wildlife populations in the Kabo safari area given the aforementioned co-operation and increased control of illegal hunting of especially elephant by the Congolese wildlife authorities and Congo Safaris.

In 1997, C.I.B. was granted the logging rights for the Kabo UFA and CS was granted safari rights for the Pokola UFA for a pilot year. More recently, a WCS [Wildlife Conservation Society] program (PROGEPP) was granted management rights for a buffer zone program for the Nouabale-Ndoki National Park (NNP), which includes the Kabo and northern Pokola UFAs. As a result of these overlapping but non-intrusive exploitation and management objectives, a protocol was developed which outlines the individual participation of WCS, CS, C.I.B., local populations and the wildlife ministry towards the common goal of:

- the rational and sustainable use of local natural resources, particularly wildlife
- the protection of the southern boundary of the NNP

Controlled subsistence hunting program for Kabo and Pokola

Through the judicious use of existing forest resources, it is probable that the protein requirements of the Pokola and Kabo communities can be sustainably satisfied while human populations remain at present levels and managed hunting methodology is applied. This is preferable to the importation of exotic protein sources (e.g., cattle, goats, etc.) that imply a high disease risk to local wildlife.

Four distinct communities are involved in developing the initial program aimed at managed wildlife use as a protein source:

Kabo — population 600?
Ndoki 2 — population 600?

Regional Rundown *continued*

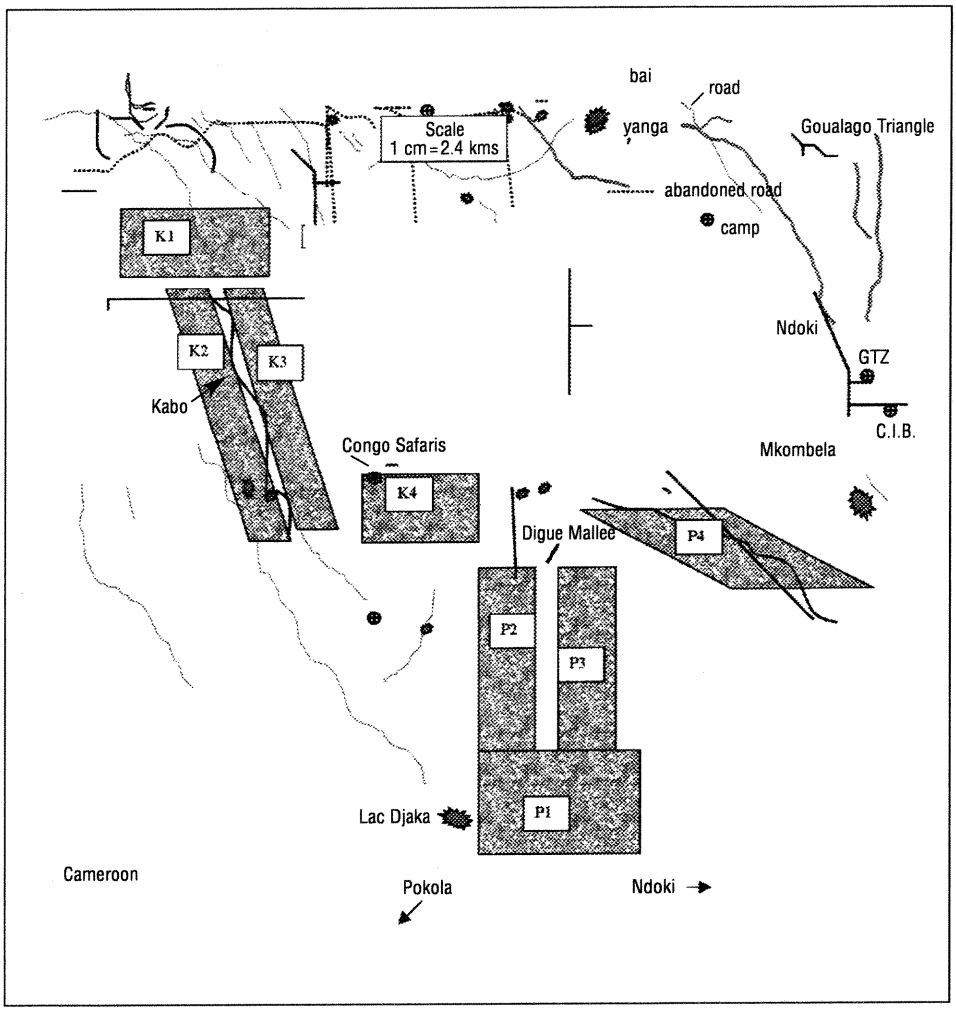

Figure. Map of Congo Safari concession area.

Ndoki 1 — population 400?
Pokola — population 12,000?

Ndoki 1 and 2's protein source should be the eastern sections of the Ndoki River of the Kabo and Pokola UFA's [map]. The controlled subsistence hunting program will be implemented on the west of the Ndoki to the Sangha initially and later expanded by separate protocol to the east of the Ndoki, particularly the region bordering on the Goualagou River.

Kabo village has a determined hunting area, which excludes the Bomassa hunting zone and the core safari area. This area should remain the prime source of bushmeat for Kabo and will be further expanded by additional access from the planned new road from Ndoki 2 to Kabo. Due to the previously mentioned zonal co-operation between Kabo and CS and the concomittent increase in wildlife, coupled with a need to assess and monitor managed wildlife populations which are subject to safari hunting, population use and logging activities, it is proposed that Kabo has access to predetermined sections of the safari area on a predetermined time-frame which will be assessed for sustainability on the estimated rate of return methodology. Four areas have been identified: K1, K2, K3, K4 (map), which should be hunted twice a year each within the following parameters:

- 10 hunters, 1 shotgun each., 4 cartridges per gun
- Species allowed determined by DREF/ Sangha
- Hunters dropped at regular intervals, certain time
- Hunters collected at certain time
- All hunted specimens recorded; species, sex, quantity, weight

As far as possible, the same procedure should be followed and monitored by a joint team of E&F, CS and WCS. WCS will develop the data and copy DREF, C.I.B. and CS.

The wildlife products collected from each exercise should be made available to the Kabo community—on auction, or at a low per/kg value. The proceeds of the sale should be 1/3 to the hunter, 1/3 to the DREF and 1/3 towards community development. Management and distribution of the funds will be applied by DREF.

Pokola village has a determined hunting area, which includes the whole UFA (west and east of the Ndoki), but excludes the core safari area. This area should remain the prime source of bushmeat for Pokola. With the need to assess and monitor managed wildlife populations which are subject to safari hunting, population use and logging activities, it is proposed that Pokola has access to predetermined sections of the safari area on a predetermined timeframe which will be assessed for sustainability on the estimated rate of return methodology.

Five areas have been identified: P1, P2, P3, P4, P5 (see attached map), which should be hunted twice a year each, within the following parameters:

- 10 hunters, 1 shotgun ea., 4 cartridges per gun
- Species allowed determined by DREF/ Sangha
- Hunters dropped at regular intervals, certain time
- Hunters collected at certain time
- All hunted specimens recorded; species, sex, quantity, weight

As far as possible, the same procedure should be followed and monitored by a joint team of E&F, CS (when hunt occurs

Controlled Hunting Calendar: July to December 1998

	July	August	September	October	November	December
Kabo		41	5	3	7	5
Pokola	11, 25	8, 22	12, 26	10, 24	14, 28	12, 26
Kabo Safari Area	4 (K1)		5 (K2)	3 (K3)	7 (K4)	
Pokol Safari Area	25 (P1)	22 (P2)	26 (P3)	24 (P4)	28 (P5)	

in safari area) and WCS. WCS will develop the data and copy DREF, C.I.B. and CS.

The wildlife products collected from each exercise should be made available to the Pokola community—on auction, or at a low per/kg value. The proceeds of the sale should be 1/3 to the hunter, 1/3 to the DREF and 1/3 towards community development. Management and distribution of the funds will be applied by DREF.

Transport

Since the principal purpose of these organized hunts is to supply the logging communities of Kabo and Pokola with protein under controlled conditions, C.I.B. and WCS (C.I.B. has supplied WCS with a vehicle for wildlife management) will transport hunters and where necessary, wildlife officials to and from the hunting site. This includes the wildlife products harvested. CS will assist when the hunting takes place in the safari area.

Program calendar

Kabo —12 organized hunts per year (8 in safari area) — 1st Sunday each month

Pokola —24 organized hunts per year (10 in safari area) — 2nd and 4th Sunday each month.

SENEGAL

Mhorr Gazelle

Mark Schulman, IUCN Senegal

Senegal is one of West Africa's more biologically diverse countries, host to some 550 different animal species. Unfortunately, due to years of drought, habitat loss and poaching, the country's dwindling wildlife populations are under constant threat, and in some cases facing extinction. The giraffe and the korrigum antelope have disappeared altogether, and if the [destruction of the] environment remains unchecked, other animals may soon experience a similar fate.

Although the future does not look so promising, all is not lost. Senegal is still home to several unique fauna, including one of the world's rarest species of gazelle—the Mhorr gazelle. The Mhorr gazelle, *Gazella dama mhorr*, once inhabited the desert from western Sahara to the Sudan, and was commonly found in Morocco, Algeria, Mali, Mauritania, Niger and Senegal. It is the largest of the dama gazelle subspecies, standing 3 ft. (0.92 m) at the shoulder and weighing up to 150 (68 kg) pounds. The lifespan of these gazelles is on average 12–15 years. Both sexes have small (14-inch, 35.9cm) ringed, S-shaped horns. The horns of the male are thicker and are used in territorial disputes. The female's horns may be used to defend food resources.

One can distinguish the Mhorr from other gazelles by its unique two-tone coloration (white and tan). This form of counter-shading, which easily obscures the outline of the animal against the desert's backdrop, often makes it difficult for predators to detect. Like most gazelles, the Mhorr can bounce stiff-legged and land on all four legs at once [stotting gait]. This characteristic is believed to communicate alarm, confusion, intimidation or to get a better look at a predator.

Listed as an endangered species under IUCN's *Red List of Threatened Animals*, the Mhorr gazelle is thought to be totally extinct in the wild. There have been no sightings of this species since 1972 when a wild herd was captured in western Sahara. Today, only small numbers of this rare animal can be found in captivity in various zoos and nature reserves throughout the world. Senegal is one of a handful of countries, along with Spain, Germany, Morocco, Tunisia and the United States, that has a reintroduction project specifically for the Mhorr.

Of the estimated 250 gazelles in captivity, 25 of them can be found in Senegal. The majority are held in the country's National Gueumbeul Reserve and the remainder are in the Bandia Nature Reserve.

The Special Fauna Reserve of Gueumbeul, located near the city of Saint-Louis along the coast, is a classified forest covering 2,250 acres. Although the reserve was established originally by the Senegalese government as a site for migrating winter birds and is designated as a Wetlands of International Importance under the Ramsar Convention, it is also an important breeding center for such Sahelian mammals as the Mhorr Gazelle. The reserve started with 16 gazelles donated by King Carlos of Spain in 1984 as a gift to the Republic of Senegal. As their numbers have grown, the enclosed pen that they are kept in has become too small. To deal with the overcrowding, three were recently given (one male and two females) to the privately-owned Bandia Reserve, south of Dakar. Opened in 1994, the Bandia has several different animal species, many once native to Senegal.

Although the reserve was created as a recreation space for tourists, it is an equally important site for the breeding and protection of wildlife. In fact, this is one of the few places left in the world where one can see the Mhorr gazelle browse peacefully on various desert shrubs and acacia trees in an environment that closely resembles its former natural habitat.

continued on next page

Regional Rundown *continued*

ALGERIA

The Edmi Gazelle In Algeria

Status and First Data on Its Ecology. Trophic Niche and the Diet Composition of Edmi at the Nature Reserve of Mergueb.

By M. Sellami[ASG], National Institute of Agronomy, 16200 El-Harrach, Algiers, Algeria

The following is the abstract of Dr. Sellami's doctoral dissertation, incorporating the findings of many years' research on *Gazella cuvieri*.

Abstract

The Edmi gazelle, *Gazella cuvieri* (Ogilby, 1841), is an ungulate adapted to life in rocky and semi-desert habitats. Its actual distribution is limited to small territories in Morocco, Algeria and Tunisia. According to the 1996 UICN *Red List of Threatened Animals* (Baillie & Groombridge, 1996), the species is threatened in the category of the EN, C2a. It means that the species is endangered, has small population size with less than 2,000 mature individuals, [is] continuing to decline and its distribution area is fragmented. Data on the status and distribution of this species in Algeria were obtained by means of a questionnaire in 1988–89. As a result the recent distribution was shown to encompass 29 localities within three mountain ranges: Atlas tellien, Hauts plateaux and Atlas saharien.

The species disappeared from the north of the country around the 1930s, and because of excessive hunting it probably became extinct in the region of Bechar since 1963. Original results dealt with this thesis' exclusive concern for the nature reserve of Mergueb (Wilaya of M'Sila) and in particular the ecology of *G. cuvieri* stock populating the reserve, including its food habits.

The reserve, the area of which encompasses 12,500 ha, is situated in the zone with a relatively cold winter climate. The summer, in contrast, is hot and dry, with a very low level of precipitation. Basically the area has a Mediterranean type of climate. Its plant communities are of the steppe type.

The animals are censused using the line transect method adapted to large mammals (Gailard, 1988). As a result, 30 individuals represented the total number. Various factors were discussed, potentially responsible of this low abundance, such as drought, physical condition of females, juvenile mortality, intraspecific aggression, stress, competition of domestic herbivores, poaching, etc.

The population of Edmi gazelles at Mergueb is composed mainly of adult animals (79.2%) of which males amount to 26%. Thus females seem to prevail with the sex ratio of 0.35 which, however, has to be considered with caution because of the low total number of animals. Irrespectively of the time of year, small groups of 2–4 individuals were most frequently observed. Concerning the group composition, the harems (44.9%) and female groups (33.3%) were most frequent, followed by solitary males and mixed groups. These results correspond to findings concerning some other species of gazelles. In *G. cuvieri*, the basic social unit is that composed of one adult female, its young-of-the year and frequently also the young of the previous year.

Our results of studying the budget of activity have shown two peaks of foraging activity, viz, in the morning and evening hours. They are separated by the spell of rest at midday. In summer, the rest predominates over foraging activity which is shifted towards night hours. Typically, the feeding is followed by resting and resting by movements. In autumn and spring, the foraging predominates during much of the day. Finally, in winter the animals feed during the day with only a brief spell of rest and/or rumination at mid-day.

Within the territory of the reserve, the Edmi population lives in sympatry with stocks of domestic sheep and goats and their competition for food seems to have some impact on it. Natural predation, on the contrary, does not seem to influence the Edmi population very much. Only the jackal (*Canis aureus algirenis*) is able to steal a newborn or to hunt young gazelles. Feral dogs of domestic origin (*sloughis*) are potentially more dangerous, but we lack exact data on their predation of Edmi gazelles.

A detailed study on the trophic niche and the diet composition of *G. cuvieri* during the whole year was performed using the method of faecal analyses. The total of plant fragments identified in Edmi gazelle dropping collected on the territory of the reserve has shown a predominance of herbs over grasses. Dicotyledon plants represent 70.9% of plant species consumed by the gazelles. Leaves predominate over other plant material with the yearly average of 91%. The dietary strategy of *G. cuvieri* consists of exploring two abundant perennial plants, viz *Salsola vermiculata* and *Helianthemum lipii*, during the whole year and in supplementing this food by a variety of other plants according to their abundance and accessibility at various times of the year. Thus, the trophic niche of the Edmi gazelle is that of generalized opportunist similar to many large ungulate herbivores.

The status and perspectives of the population in question are discussed. The harsh climate and trophic limitations do not seem to be the main ecological factors controlling its population density. Direct impact of human activities such as pastoralism, derangement, poaching and perhaps the predation by feral dogs seem to be the main reasons of the low population numbers of *G. cuvieri* at Mergueb.

TUNISIA

Sidi Toui Oryx Project

Simon Wakefield[1] & Renata Molcanov[2],

Introduction

Following a request to the EEP for scimitar-horned oryx [*Oryx damah*] to go to a new release/reintroduction site at Sidi Toui National Park in Tunisia, a group of 10 animals from a range of European zoos have been identified by the Coordinator as being

suitable for the project. This group has been assembled to satisfy the following criteria:

i) To represent, as far as possible, a genetically separate line to the animals already in Bou Hedma National Park;
ii) To be as genetically diverse within the released group as possible; it will in addition be possible to send the three adult female oryx chosen from Bratislava Zoo in the early stages of pregnancy by another male, unrelated to the released group;
iii) To have an age and sex structure which will maximize group cohesion during the early stages of release.

A visit was made in June of 1997 to the release site by Simon Wakefield, Tommy Smith (Convention on Migratory Species), and Köen de Smet (IUCN/SSC Reintroduction Specialist Group) and certain actions were recommended. The financial and technical support required could then be identified and donor organizations approached.

Following the Workshop on the Reintroduction of Sahelo-Saharan Antelope and Gazelle, held 19–23 February 1998 in Djerba, Tunisia, there was the opportunity to make a second visit to the proposed new release/reintroduction site at Sidi Toui National Park, by the authors.

This short proposal summarizes the present situation and puts forward suggestions for consideration by the Direction General des Forêts in order to take this project forward. The main aim of these suggestions is to make a short detailed summary of the resources required and to identify areas of responsibility of each of the participating organizations in order for the release/reintroduction to meet, as far as is possible, the guidelines laid down by the IUCN/SSC Reintroduction Specialist Group... These guidelines were accepted by the Workshop in Djerba as being fundamental to such projects.

Sidi Toui NP

The exclusion of domestic stock by two separate fence lines (an outer barbed wire fence constructed in 1990, and an inner Ursus-style fence constructed in 1996) has enabled a significant regrowth of desert vegetation. Although trees and shrubs, which would provide valuable shade, are lacking at present, regeneration of *Periploca laevigata*—which can grow to 3m—is very noticeable.

A close examination was made of the present facilities at Bir Turki, which is the intended acclimatization area for groups of animals to be released. The present facilities consist of a small complex of four acclimatization/holding pens and, separated by about 40m, a 5ha pre-release enclosure provided with four shelters, each with a water trough. In one corner of the pre-release enclosure, a small area has been sectioned off as a pen which at present holds the male slender-horned gazelle being hand-reared last year, and a young dorcas gazelle from Sidi Toui.

The acclimatization/holding pens are arranged either side of a central corridor and are completely surrounded by an outer fence. Ursus-style fencing has been used throughout, but only up to a height of 1.2m in places and is in poor condition. Adjacent pens are separated by only a single fence line which can result in serious injuries if animals are aggressive towards each other through the fence. There is also insufficient shade provision, visual screening of fences and no gates were in evidence: access to all enclosures involved dismantling part of the fence.

The fence around the pre-release enclosure is chain-link to a height of over 2m and is in good condition. A supply of water is available but at present there are no facilities for storing food and hay for the animals in any significant quantity.

Recommendations

The present facilities at Bir Turki would not be suitable for managing a group of 10 adult and sub-adult oryx which have been brought from separate locations. This would require proper gates, separation of adjacent enclosures, suitable close handling (crush) facilities and easy access for feeding and watering. However, we believe that it would be possible to make some simple, inexpensive modifications to achieve this.

Some drawings are attached [not included] to give an impression of the suggested new layout, which makes as much use of the existing fence lines as possible in order to reduce costs. The drawings also show technical details of the fences, gates and fittings. Bratislava Zoo can provide any specialized fittings (e.g., hinges) which are required.

The Scimitar-horned Oryx EEP

The commitment of the Scimitar-horned Oryx EEP to any release or reintroduction programme is governed by a desire to assist wherever possible with these programmes and to learn as much as possible about the animals which are released. Responsible zoological collections have been asked by the EEP Antelope TAG to participate only in those release/reintroduction programmes which meet the internationally recognized guidelines drawn up by the IUCN/SSC Reintroduction Specialist Group. We would like, therefore, to take all essential steps, in collaboration with the Direction Gènèral des Forêts, to ensure that these guidelines are being followed as far as resources allow.

The Scimitar-horned Oryx EEP also undertakes, with assistance from the EEP Antelope TAG, to secure support from financial and technical donor institutions in order to realize these aims. We would like, therefore, to propose that an undertaking is made between the Scimitar-horned Oryx EEP and the Direction Gènèral des Forêts in order to achieve the best outcome for both parties in terms of cooperation and an increase in knowledge and experience.

The Scimitar-horned Oryx EEP, in cooperation with the EEP Antelope TAG, is willing to provide the following:

- A group of 10 adult and subadult scimitar-horned oryx, *Oryx dammah*, with the required genetic and age/sex profile for the release group

Regional Rundown *continued*

- Funding for the transport of the animals, including the cost of crates, to the international airport nearest to the release site (i.e., Djerba Zarzis)
- A supply of pelleted feed for the duration of the animals' stay in the acclimatization area
- Two technical staff to oversee acclimatization and integration of the release group prior to release, and to carry out monitoring following release
- Training by above technical staff of Tunisian counterpart(s) in relevant aspects of animal management and monitoring to enable continuation of project and development of expertise

The following items are requested from the Direction Gènèral des Forêts:

- The suggested alterations to the existing acclimatization area at Bir Turki
- Transport from the international airport to the acclimatization area
- A supply of hay during the period of acclimatization
- Accommodation for the technical staff in the Ecomusee
- Improvements to the Ecomusee to enable long-term use: repair of the water supply to restore function to the toilets, shower and kitchen; a heater; designation of rooms as an office, simple laboratory/ storage room for samples, and sleeping/ living room.
- Regular vehicular communication with Ben Guardane for obtaining supplies
- Suitable form of transport within Sidi Toui (horse, mule?); walky-talky sets for technical staff
- Veterinary help

Time frame

We think it would be realistic to work towards a transport of oryx to Sidi Toui during the next cool period (i.e., Winter/ Spring '98/99).

Context of this Proposal

This action could ultimately be part of an overall reintroduction program between the Bonn Convention on Migratory Species, Direction Gènèral des Forêts, IRA (Desert Research Institute, Medenine, in cooperation with Ghent University) and EAZA/EEP aimed at the long term evaluation of existing and new reintroduction projects in Tunisia, to include:

- monitoring of the reintroduced populations (ethology, ecology);
- monitoring of the effects of the reintroduced populations on the steppe/desert habitat;
- training of Tunisian nationals in monitoring techniques in order to strengthen the wildlife study group of the Division de la Production Animal of IRA;
- scientific cooperation with specialized institutions in Europe and elsewhere to strengthen the research base (Ph.D., MSc) within Tunisia.

1 Scimitar-horned Oryx EEP Coordinator. Marwell Zoological Park, Colden Common, Nr Winchester, UK, e-mail: wakefield@marwell.org.uk

2 Scimitar-horned Oryx EEP Committee, Zoologick-zhrada Bratislava Mlynskdolina 1, 842 27 Bratislava, Slovakia.

The above proposal was sent as an attachment, originally in a 31 July 98 e-mail to John Newby at WWF, Gland. In the e-mail, Wakefield reports receiving $25,000 for the project "through the help of Köen de Smet" [ex-ASG] and that the proposal was accepted by the Department Gènèral des Forêts. Wakefield and Molcanov planned to go to Tunisia again in October, hopefully to "sign some formal agreement...and begin putting things into reality on the ground."

SUDAN

Status, Abundance and Distribution of Four Endangered Wildlife Species in Eastern Sudan

By Ibrahim M. Hashim [ASG]***,***
Wildlife Research Centre,
PO Box 30, Khartoum North

Project sponsored by the ASG and supported by the Zoological Society of San Diego and the Zoological Society of London

Introduction

The savanna zone and the arid regions in Eastern Sudan are showing rapid changes. These changes are attributed to the expansion of demarcated agricultural schemes, the building of highways and the increase in the free-ranging livestock industry. These changes, accompanied by poaching, affected wildlife directly or indirectly by depleting their habitats, reducing their number, limiting their distribution and by exterminating some of the species. The species that are mostly affected include tora hartebeest (*Alcelaphus buselaphus tora*), Soemmering's gazelle (*Gazella soemmeringii*), the wild ass (*Equus africana*) and Singa/Heuglin's gazelle (*Gazella rufifrons tilonura*).

Tora Hartebeest

The tora hartebeest is a social animal which occurs in herds of 4 to 20 head and may aggregate into hundreds. Aggregations of thousands were reported in the past (Dorst and Dandelot, 1970). Tora hartebeest prefers an open country with sparse bush, particularly undulating country. It has also been observed in tall savanna woodland. The animal was abundant at Abiat in the middle of Dinder National Park in 1905 (Harrison, 1905). Recently, the hartebeest has been restricted along the Ethiopian border in the Blue Nile State and Kassala State (Hillman and Fryxell, 1988).

Soemmering's Gazelle

Soemmering's gazelle occurs in the eastern part of Sudan beyond Atbara River. The range of the gazelle extended southward to Dinder National Park. Thousands of the gazelles were reported in the park during the dry season (Harrison, 1905). Nimir (1983) cited Forbes (1950) and Monson (1924) who noted that Soemmering's gazelle was very common in Dinder National Park and around Erief el Dir, 30

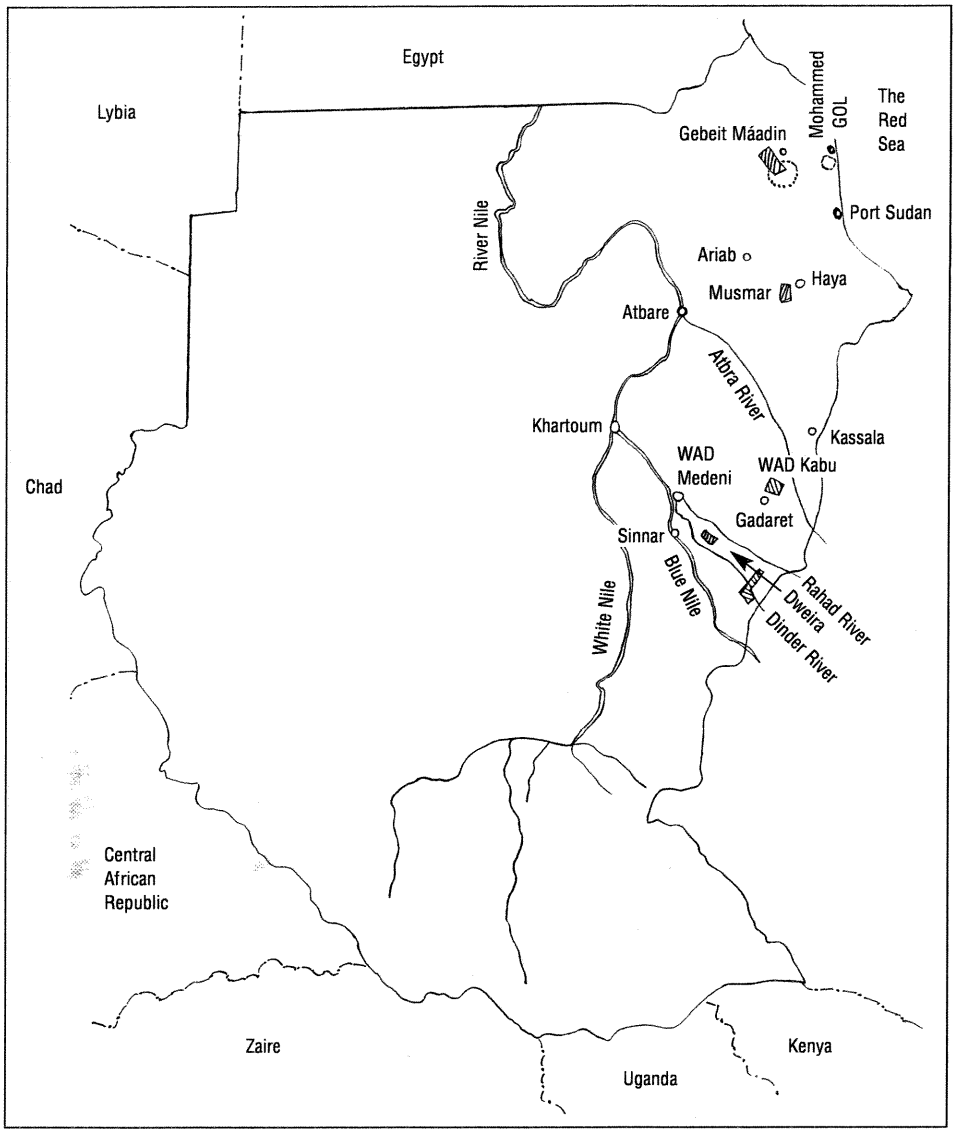

Figure 1. **Distribution of Singa/Heuglin's gazelle (*Gazella rufifrons tilonura*)**
Distribution of wild asses (?)

km north of the park. The gazelle used to migrate between the breeding habitat in Butana Plains north of the park and the dry season habitat in Dinder National Park. It is not known whether the range of the gazelle extended to the Red Sea Hills. Anecdotal information, however, suggested that some of these gazelles were endemic to the Red Sea Hills.

Wild Ass

The African wild ass is the least known animal in Eastern Sudan. No study has been done before to assess its abundance and distribution. Moehlman (1992) cited Watson (*in lit.* 1982) who saw hundreds of these asses during aerial surveys in border areas between Sudan and Eritrea. Watson, however, cautioned that the population he saw was mixed in characteristics that differentiate domestic from wild individuals. It is worth mentioning that donkeys produce fertile cross with the African wild ass. This leads to the development of donkeys from wild asses, which serve as beasts of burden all over the world (Moehlman, 1992). Donkeys are sympatric with the wild ass throughout their ranges.

Singa Gazelle

Singa/Heuglin's gazelle is sometimes considered a full species and it is the eastern representative of the red-fronted gazelle (Dorst and Dandelot, 1970; Hillman and Fryxell, 1988). It can only be distinguished by the shape of the horns, their tips turning inwards and being sharply hooked. Mackenzie (1954) suggested that Singa gazelle is a hybrid between the Mongala gazelle (*Gazella thomsonii albonotatus*) and the local species of Soemmering's gazelle. According to Dr. P. Grubb (*in lit.* 1998), Singa gazelle belongs with the smaller gazelles (*Eudorcas*) and is either a subspecies of red-fronted gazelle or a very closely related species occurring on the eastern side of the Nile. The type locality of the gazelle is known from the valleys of Setit and Atbara. It is smaller than the red-fronted gazelle (*G. rufifrons leavipes*) from west of the Nile and it has rather short horns. Intermediates between *G. r. leavipes* and *G.r.tilonura* are recorded from lower Atbra at Kitwit and Kassala State. It is possible that while *tilonura* occurs only east of the Nile and *leavipes* only west of the Nile, *leavipes* is found in [a] few places east of the Nile as well and has there hybridized with *tilonura*. The species has not been reported from the Red Sea.

The red-fronted gazelle inhabits steppes, open and arid country with thorn bushes. The gazelle avoids thick cover (Dorst and Dandelot, 1970) where it lives singly, in pairs or in smaller herds, averaging 5–6 head and never exceeding 15.

The red-fronted gazelle feeds on grasses and also browses on Acacia and various other shrubs (i.e., *Calotropis*; *Balanites*, *Ziziphus*, *Leptadenia*, *Boscia*, *Salvadora* and *Euphorbia*) (Dorst and Dandelot, 1970).

The survey of tora hartebeest, Soemmering's gazelle, the wild ass and the red-fronted gazelle has been sponsored by the Antelope Specialist Group (ASG) as no information about the abundance and distribution of these animals was available. Objectives of the study were the following:

- To determine the abundance and distribution of tora hartebeest, wild ass, Soem-

Some gazelles survived the infection into November though they still limped. Through the Conservation Center we obtained 3 freshly killed adults (1 male, 2 females) that limped and 4 (2 males, 2 females) that were healthy. The latter were in much better condition, as measured by body fat. Mesenteric fat of healthy gazelles averaged 716g (190–895) as compared to 38g (1–83) of the impaired ones, and fat around the left kidney averaged 70g (27–117) as compared to 9g (2–17). Given a long, severe winter and forage low in nutrients, it is unlikely that animals with greatly reduced fat reserves will survive.

Did the disease affect the age classes and sexes equally? The ratio of adult males to adult females among the dead was 66:100. Males often travel partially segregated from females and even large composition counts of herds may be biased. Between June 13–16, 1998, just before the start of the main birth season, the ratio was 49:100 (n=4842 in total sample). It was our impression that adult males did not die in markedly disproportionate numbers.

Just before the onset of calving, between June 19–22, 1998, 95.6% of adult females (n=903) were pregnant. At that time, the young of 1997 were just 12 months old and were classified as yearlings. The ratio of yearlings to adult females was 53:100, suggesting that half the young survived the first year of life. In July 1993, after the main birth season, the young to female (yearling and adult combined) ratio was 66:100 (n=5100); and in August 1994 the ratio was 42:100 (n=405). These latter results are not wholly comparable to the June 1998 data because adult and yearling females were not classified separately. However, at least half of the young in a normal season seem to survive into winter. Counts of gazelles (n=2609) between November 5–21, 1998 gave a ratio of only 11 young: 100 females. Most young had died since the June 28–July 4 birth peak. The sample of disease deaths does not, however, show an unusually high number of young (41 young: 100 adult females). Mortality on the calving grounds was low, probably less than 5%. Young possibly died early of exposure during the heavy rains, or necrovateries killed them before the others in areas we did not visit.

Dead yearlings in the sample were present at a ratio of 148:100 adult females, in contrast to a ratio of 53:100 in the population during June. Mortality of yearlings was at least three times the expected number.

Thus the disease outbreak had a major impact on the survival of the 1997 and 1998 age classes, and this reduction in their numbers will affect population structure for several years. No reliable estimate of the total number of deaths can be made, though it killed thousands over a wide area in Dornod Province. Mongolia has had a commercial gazelle harvest in most years since 1932 (Reading *et al.*, 1998), but it was canceled in 1998 because of the die-off. The population will soon rebound in number, and it will need careful annual monitoring so that a viable long-term conservation and management program can be developed.

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