Letter from the Chairman:
MARK STANLEY PRICE

Perhaps the most significant part of this larger issue of RSG News is the draft guidelines for re-introductions. These represent the efforts of many people. They cover the re-introduction of any organism, whether plant or animal, and in due course we expect that there will be more detailed guidelines or even recommended procedures tailored to different taxa. We hope that the guidelines will be edited once more before submission to the SSC Steering Committee for approval. That is why we solicit comments by the end of July 1992, and we would ask section chairs particularly to scrutinise them and enlist any other expertise that might help. I should point out that while the guidelines are obviously oriented to the release of captive-bred individuals, they should be equally applicable to wild-to-wild translocations, where these are true re-introductions or re-inforcements. Clearly, where there is a great deal of experience of moving a species, it is unrealistic to expect the guidelines to be followed in the letter. A case in point is the South African situation, mentioned by Jeremy Anderson (p.8), where 20,000 ungulates are moved annually. This is a routine affair, but as his article shows, experience with carnivore re-introductions is relatively embryonic and the results mixed. Carnivore releases in South Africa need more careful planning and monitoring. The other articles on re-establishing large carnivores only confirm this.

Re-introductions continue to attract much interest on the conference circuit (see p.4-5), and the Jersey conference allowed an RSG meeting to be held. Minutes are being distributed to those who attended and to section chairs. If anyone else wishes a copy for their records, please say so.

In my AWF capacity I attended the CITES Conference of Parties in Kyoto in March. The Netherlands submitted a draft resolution "Return to the wild of confiscated live animals of species included in Appendices II and III". After consultations at the meeting, RSG made the point in committee that although the reasoning behind the motion was appreciated, the resolution covered two issues, namely repatriation and then re-introduction into the wild. While the former was obligated under existing CITES regulations, release into the wild might not necessarily be the best solution. Although the proposal stated many of the problems of return to the wild, the complexities required more consideration. The upshot was that it was agreed that SSC, especially RSG, and the CITES Animal Committee should work on a revised proposal for consideration at the next CITES conference in late 1994. There have already been developments on this; the whole issue of releases, often of marine mammals, was discussed at the Jersey RSG meeting. SSC has asked for a small task force to consider the matter. This will be coordinated by Joshua Ginsberg, with inputs from the CBSG and VSG.

We can provide further information to any RSG member who would like to present opinions on this subject. We are keen to obtain any literature or thinking on repatriation and release. The matter will also be discussed at the CITES Animal Committee meeting in Harare in July 1992. While there is no doubt that RSG's prime interest must be in release as a basis for the re-establishment of populations, rather than marginal re-inforcements of potentially grave implication, RSG should help in developing sensible policies for international conservation.

Finally, RSG is losing its executive assistant, Alison Wilson. Her husband Ed is leaving the WWF Regional Office for Eastern Africa to move to WWF International in Gland. Those of you who have corresponded with or met Alison will appreciate the effort and energy she has put into getting the RSG up and running over the last 3 years. She may be able to work on certain RSG tasks from Switzerland, and I hope this will happen. Her replacement in Nairobi will be Minoo Rahbar, who has a degree in Anthropology from the University of California, Berkeley, with emphasis on environmental issues and human ecological relations. She has also worked in Washington DC for a major environmental NGO. Minoo is gradually taking over, and I hope that many members will soon be in contact with her.

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RSG c/o African Wildlife Foundation has moved to the British American Centre on Ragati and Mara Roads, Nairobi. The postal address and telex numbers remain the same. The new telephone and fax numbers are:
Tel: (+254 2) 710367 Fax: (+254 2) 710372
DRAFT GUIDELINES FOR RE-INTRODUCTIONS

These have now been reviewed by the RSG Section Chairs and were further discussed by participants at the Caracas workshop. For the information of all RSG members, they are printed below. We welcome your comments and suggestions; please send them to the Nairobi office BEFORE THE END OF JULY 1992.

INTRODUCTION

The policy guidelines have been drafted by the Re-introduction Specialist Group of the Species Survival Commission. They are intended to act as a guide to procedures useful to re-introduction programmes and do not represent an inflexible code of conduct. Many of the points are more relevant to re-introductions using captive-bred individuals than to translocations of wild species. Others are especially relevant to globally endangered species with limited numbers of founders. Each re-introduction proposal should be rigorously reviewed on its individual merits.

This document is very general, and worded so that it covers the full range of plant and animal taxa. It will be regularly revised. Handbooks for re-introducing individual groups of animals and plants will be developed in future.

1. DEFINITION OF TERMS

"Re-introduction": an attempt to establish a species* in an area which was once part of its historical range, but from which it has become extinct. ("Re-establishment" is a synonym, but implies that the re-introduction has been successful).

"Translocation": movement of individuals or populations from one part of their range to another.

"Re-inforcement/Supplementation": addition of individuals to an existing population of con specifics.

"Conservation/Genetic Introductions": an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area.

2. AIMS AND OBJECTIVES OF THE RE-INTRODUCTION

A re-introduction should aim to establish a viable, free-ranging population in the wild, of a species or subspecies which was formerly globally or locally extinct (extirpated). In some circumstances, a re-introduction may have to be made into an area which is fenced or otherwise delimited, but it should be within the species' natural habitat and range, and require minimal long-term management.

The objectives of a re-introduction will include: to enhance the long-term survival of a species; to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem; to increase biodiversity; to provide long-term economic benefits to the local and/or national economy; to promote conservation awareness; or a combination of these.

Re-introductions or translocations of species for short-term, sporting or commercial purposes are not a concern of the RSG. Re-introductions are generally long-term projects that require the commitment of long-term financial and political support.

3. MULTIDISCIPLINARY APPROACH

A re-introduction requires a multidisciplinary approach involving a team of persons drawn from a variety of backgrounds. They may include persons from: governmental natural resource management agencies; non-governmental organisations; funding bodies; universities; zoos or botanic gardens, with a full range of suitable expertise. Team leaders should be responsible for coordination between the various bodies and provision should be made for publicity and public education about the project.

4. PRE-PROJECT ACTIVITIES

4a. BIOLOGICAL

Feasibility study and background research
- An assessment should be made of the taxonomic status of individuals to be re-introduced. They should be of the same taxonomic unit (and ideally closely related genetically) as those which were extirpated. An investigation of historical information about the loss and fate of individuals from the re-introduction area, as well as molecular genetic studies, should be undertaken in case of doubt. A study of genetic variation within and between populations of this and related taxa can also be helpful. Special care is needed when the population has long been extinct.
- Detailed studies should be made of the status and biology of wild populations (if they exist) to determine the species' critical needs; for animals, this would include descriptions of habitat preferences, social behaviour, group composition, home range size, shelter and food requirements, foraging and feeding behaviour, predators and diseases. For plants it would include biotic and abiotic habitat requirements, dispersal mechanisms, reproductive biology, symbiotic relationships (e.g. mycorrhizae, pollinators), insect pests and diseases.
- A Population and Habitat Viability Analysis will aid in identifying significant environmental and population variables and assessing their potential interactions, which would guide long-term population management.

Previous Re-introductions
- Thorough research into previous re-introductions of same or similar species and wide-ranging contacts with persons having relevant expertise should be conducted prior to and while developing re-introduction protocol.

Choice of release site
- Should be within historic range of species and for an initial re-inforcement or re-introduction have few, or no, resident wild population (to prevent disease spread, social disruption and introduction of alien genes). A conservation/benign introduction should be undertaken only as a last resort when no opportunities for re-introduction into the original site or range exist.
- The re-introduction area should have assured, long-term protection (whether formal or otherwise).
Evaluation of re-introduction site
- Availability of suitable habitat: re-introductions should only take place where the habitat and landscape requirements of the species are satisfied, and likely to be sustained for the foreseeable future. The area should have sufficient carrying capacity to sustain growth of the re-introduced population and support a viable (self-sustaining) population in the long run.
- Identification and elimination of previous causes of decline: could include disease; over-hunting; over-collection; pollution; competition with or predation by introduced species; habitat loss.
- Where the release site has undergone degradation, a habitat restoration programme should be initiated.

Availability of suitable release stock
- Release stock ideally should be closely-related genetically to the original native stock.
- If captive or artificially propagated stock is to be used, it must be from a population which has been soundly managed both demographically and genetically.
- Re-introductions should not be carried out merely because captive stocks exist, nor should they be a means of disposing of surplus stock.
- Removal of individuals for re-introduction must not endanger the captive stock population. Stock must be guaranteed available on a regular and predictable basis, meeting specifications of the project protocol.
- Stock must meet health regulations of recipient country and adequate provisions made for quarantine if necessary.

4b. SOCIO-ECONOMIC AND LEGAL ACTIVITIES
- Socio-economic studies should be made to assess costs and benefits of re-introduction programme to local human population.
- If cause of species decline was due to human factors (e.g. over-hunting, over-collection, loss of habitat), a thorough assessment of attitudes of local people to the proposed project is necessary to ensure long term protection of the re-introduced population. The programme should be fully supported by local communities.
- Where the security of the re-introduced population is at risk from human activities, measures should be taken to minimise these in the re-introduction area.
- The policy of the country to re-introductions and to the species concerned should be assessed. This might include checking existing national and international legislation and regulations, and provision of new measures as necessary. Re-introduction must take place with the full permission and involvement of all relevant government agencies of the recipient or host country.
- If the species poses potential risk to life or property, these risks should minimised and adequate provision made for compensation where necessary. In the case of migratory/mobile species, provisions should be made for crossing of international/state boundaries.

* the taxonomic unit referred to throughout the document is species: it may be a lower taxonomic unit (e.g. sub-species or race) as long as it can be unambiguously defined.

5. PLANNING, PREPARATION AND RELEASE STAGES
- Construction of multidisciplinary team with access to expert technical advice for all phases of the programme.
- Approval of all relevant government agencies and land owners, and coordination with national and international conservation organizations.
- Development of transport plans for stock to country and site of re-introduction.
- Identification of short-and long-term success indicators and prediction of programme duration, in context of agreed aims and objectives.
- Securing adequate funding for all programme phases.
- Design of pre- and post-release monitoring programme so that each re-introduction is a carefully designed experiment with the capability to test methodology with scientifically collected data.
- Appropriate health and genetic screening of release stock. Health screening of closely related species in re-introduction area.
- Appropriate veterinary or horticultural measures to ensure health of released stock throughout programme. This to include adequate quarantine arrangements, especially where founder stock travels far or crosses international boundaries to release site.
- Determination of release strategy (acclimatization of release stock to release area; behavioural training; group composition, number, release patterns and techniques; timing)
- Establishment of policies on interventions (see below).
- Development of conservation education for long-term support; professional training of individuals involved in long-term programme; public relations through the mass media and in local community; involvement where possible of local people in the programme.

6. POST-RELEASE ACTIVITIES
- Post release monitoring of all (or sample of) individuals. This may be by direct (e.g. tagging, telemetry) or indirect (e.g. spoor, informants) methods as suitable.
- Demographic, ecological and behavioural studies of released stock.
- Study of processes of long-term adaptation by individuals and the population.
- Collection and investigation of mortalities.
- Interventions (e.g. supplemental feeding; veterinary aid; horticultural aid) when necessary.
- Decisions for revision, rescheduling, or discontinuation of programme where necessary.
- Habitat protection or restoration to continue where necessary.
- Continuing public relations activities including education and mass media coverage.
- Evaluation of cost-effectiveness and success of re-introduction techniques.
- Regular publications in scientific and popular literature.
Recent Meetings

IVth World Congress on National Parks and Protected Areas "Parks for Life: the Role of Protected Areas in Sustaining Society" held in Caracas, Venezuela, 10-21 February 1992.

A number of meetings of relevance to RSG members were held covering the topics of re-introduction, introduced species and habitat restoration. During the Symposium Session a paper entitled "Putting species back in the ecosystem" was presented by Mike Maunder.

RSG was involved in the organisation and chairing of a Re-introduction Workshop. An international group of speakers presented papers on a variety of projects, including the transport and re-introduction of game species in South Africa (Jeremy Anderson, Kaggwane Parks Board); a debate on the use of appropriate sub-species and intra-specific hybrids for re-introduction (Doug Williamson, Saudi Arabia); public relations required for wolf re-introductions in the USA (Doug Fisher, Defenders of Wildlife); re-introduction of pudu in Argentina (Eduardo Ramilo, Argentina); the re-introduction of Arabian oryx to Saudi Arabia (Georg Schwede, NWRC, Saudi Arabia); a history of European ibex re-introductions in Europe (Michael Stuwe, Smithsonian Institute) and a review of re-introductions in India (M.K. Ranjit Singh, Ministry of Environment, India). Presentations were made on the problems of plant re-introductions in Mauritius (Wendy Strahm, WWF) and a review of the role of botanic gardens by Vernon Heywood (Botanic Gardens Conservation Secretariat). Sadly, the important fields of invertebrate, fish or "herp" re-introductions were not represented. It is hoped that a number of the papers presented can be published in RE-INTRODUCTION NEWS. The sessions were chaired by Mike Maunder, with vice-chair Ibsen de Gusmao Camara.

A subsequent discussion session was used to further develop the RSG's draft Guidelines for Re-introductions. Preceding the re-introduction workshop, a valuable session was held on the problems of invasive species. Experience in New Zealand and the Mascarenes revealed invasive species to be one of the most profound threats to biodiversity and a major obstacle to successful re-introductions.

Linkage between the workshops on re-introduction and on restorations (chaired by David Lamb, University of Queensland) resulted in some stimulating debate on the relationship between the two. It was concluded that restoration ecology should operate at three levels: species, habitat and landscape. A joint recommendation was made to the compilers of the Caracas Declaration promoting the value of restoration ecology in protected area management.

The workshop will contribute to a revised version of the IUCN's 1987 "Position Statement on the Translocation of Living Organisms" which is being developed by RSG, and from this a manual on re-introduction procedures should be developed.

Contributed by Mike Maunder, Plants Section Chair, RSG & Royal Botanic Gardens, Kew.


Fifty-five people attended this PVA to define a conservation strategy for Lycaon pictus, the African wild dog. It was co-sponsored by the IUCN/SSC Canid Specialist Group and the Tanzania Wildlife Division. Participants included experts on Lycaon biology and captive breeding, veterinarians, representatives from local NGO's and representatives from the seven range states supporting large (300 dogs) populations (South Africa, Namibia, Botswana, Zimbabwe, Zambia, Tanzania and Kenya).

There is potential for both in situ and ex situ captive breeding programmes. However these must proceed with caution: the International Studbook keeper (B.Brewer, Chicago Zoological Society) presented data showing that the entire captive population (300) is derived from a distinct southern African sub-species. This was confirmed by genetic evidence presented by R.Wayne, Institute of Zoology, London. Yet the eastern and western African populations are the most critically endangered. Efforts must be made to include other genetic stocks in the captive population if countries such as Uganda and Rwanda are to attempt to re-establish extirpated populations.

With over 3000 animals remaining in the wild, immediate action must concern in situ conservation. Long term plans must examine the role of re-introduction and translocation particularly for east and west Africa. Re-introduction of Lycaon, which breeds and hunts communally, will require a large number of founders and immense effort and expense. Data presented by L. Scheepers (Namibia National Parks) on re-introduction attempts in Etosha suggest that it is extremely difficult when using captive-bred stock. Three attempts (approx. 20 individuals in total) have ended in failure, and emphasis has now shifted to translocation of packs threatened by farmers, with education programmes to improve the probability of survival in farming areas.

Contributed by Dr. Joshua Ginsberg, Zoological Society of London.
Sixth World Conference on Breeding Endangered Species 'The Role of Zoos in Global Conservation' 4-6 May 1992, Jersey, Channel Is. "Two black-footed ferrets drift in the Sea of Extinction" is how one delegate described this logo (designed by Adrian Cerda). Co-sponsored by the Jersey Wildlife Preservation Trust, the Fauna and Flora Preservation Society, and the Zoological Society of London, this meeting focussed largely on the potential for re-introduction of captive-bred species. Of over forty papers presented, many highlighted re-introduction projects, including golden lion tamarin, Bali starling, Hawaiian goose, California condor, Przewalski’s horse, brush-tailed phascogale and black-footed ferret. Other papers described proposed and on-going re-introductions in Venezuela, the former USSR, Mauritius, New Zealand, the Phillipines, and southern Africa. There were also general presentations on the captive breeding and re-introduction of invertebrates, reptiles and fish. Papers specific to the re-introduction process were presented by Alison Wilson, Ben Beck and Devra Kleiman of the RSG.

A meeting of the RSG took place during the conference, attended by over 30 persons. The agenda included the draft Guidelines for Re-introductions (see page 2), a report on the Caracas workshop (see page 4), a call for closer links with restoration ecologists, and progress on the project databases. The liveliest debate, however, centred around the question of RSG involvement in releases of individual animals confiscated from the illegal trade or from oceanaria and military establishments. There was a general consensus that this was (with certain exceptions) a welfare, rather than a conservation, issue. However, at the request of the IUCN/SSC, a task force comprised of four persons from from RSG/CBSG/VSG was convened to draft a position statement and guidelines.

FORTHCOMING MEETING

This conference aims to take stock of re-introduction projects undertaken to date in the Australasian region, provide a forum for discussion about all aspects of re-introduction biology and promote the development of a communication network among individuals and organisations involved in re-introduction efforts generally. Contact: Dr. Melody Serena, Healesville Sanctuary, P.O.Box 248, Healesville, VIC 3777, Australia. Tel: (059) 62 4022. Fax (059) 62 2139

RSG ACTIVITIES

Bibliographic databases
We now have approximately 300 reprints or photocopies of articles and papers about re-introductions in our Nairobi library. Titles are entered on a REFSYS database and fully cross-referenced. (The database refers only to articles in the library and is therefore not a comprehensive list of re-introduction literature). Members of RSG can now ask for a print-out of the full list or of titles concerning a particular group of animals. If demand for these becomes large, we will have to ask for a small fee to cover photocopying, paper and postage.

In addition, Mike Maunder at the Royal Botanic Gardens, Kew, is developing a bibliography of plant re-introductions and habitat restorations.

Photocopies of papers themselves would normally only be made available to members who do not have access to comprehensive libraries.

Project databases
Currently, two project databases are under development: the first concerns re-introductions of captive born animals and includes details of numbers of individuals released and an assessment of success or failure. This is being undertaken by Dr Ben Beck of the National Zoo in Washington DC, USA, and data gathering has been by questionnaire to managers of programmes involving captive-breeding for re-introductions.

The second is a more general database of re-introductions, including translocations of wild-caught individuals which undertakes to form a broad overview of the species being re-introduced, countries and institutions involved. This is being undertaken by the Nairobi office and includes data from the literature and from personal communication with RSG members.

Preliminary results from both databases will be published as part of the proceedings of the 6th World Conference on Breeding Endangered Species held in Jersey 1992.

Members are requested to send information about new re-introduction projects to the Nairobi office.
RE-ESTABLISHING LARGE PREDATORS

Carnivore Section Co-Chair Don Moore discusses the political problems facing the re-introduction of large predators in the USA and offers some potential solutions.

We now talk about re-introducing endangered carnivores, following the recent success of red wolf re-introductions in the USA, and lynx re-introductions in Europe and the USA. Biologically, most of the proposed projects should be successful, given adequately sized protected areas, a good prey base and compatible, healthy animals trained to fend for themselves. However, we are all aware that sound wildlife management programmes result from complex interactions of individuals expressing human desires and value judgements, often related more to socio-political and historic perspectives than to strict biological concerns.

Less than one generation ago we were exterminating wolves and other carnivores in the USA to provide maximum production of ungulates for human consumption. Although the recreational and aesthetic values of wolves were supposedly considered equally with those of the prey base in management decisions, wolf populations were generally managed to minimise human-wolf conflicts over use of the ungulates. Wolves were exterminated using poison, "wolfgetters", aerial shooting and bounty trapping of wolves and coyotes. Treatment of carnivores as "varmints" was not unique to the US; predators have been persecuted as our competitors around the world. This is the tip of the historical, personal and institutional iceberg around which we all work, and we should not lose sight of the fact.

Carnivore re-introductions need preliminary habitat and prey assessment, but more importantly they need assessment and majority consensus of the local human population. These humans have likely been raised on the fairy tale literature, where carnivores are the villains of the animal world. If they were not bad enough that these prejudices have to feed during grade school, they are re-inforced throughout adult life by sensationalist news reporters. Recent articles have read "Man-eating lion in northern India eats 63 nubile virgins"; "Bear mauls girl in Yellowstone" (the girl was, if I remember correctly, in some reproductive stage that would of course attract the bear); "Shark eats swimmer" (I wonder what sexual stage the swimmer was in!). The message is clear: we as a species must prevent these villainous carnivores from triumphing over virtue and innocence.

Public perceptions can be and have been changed. Public education is needed, but adult citizens will hardly believe biologists (who have a vested interest in the re-introduction) who say that re-introduced carnivores pose no threat to livestock. They need to know the truth from a trusted neighbour and friend, possibly one who is working on the re-introduction project. Their fears might include "Will the animals harm us or our livestock? Will they move out of the re-introduction area, and how far? How do biologists keep track of them? Will they eat the kids? Can they be recaptured when they cause trouble? Will they eat the family pet? Are you sure they won't eat the kids? Will we still be able to hunt, farm, develop the land etc? Will they eat "our" deer? WILL THEY EAT THE KIDS?"

Prejudices against predators may differ greatly between developed and developing countries. In the US and Europe, TV nature programmes, zoo outreach programmes, nature centres and national parks have helped change negative public opinion. In other parts of the world, these education efforts are just beginning, making it easier to gain support for a carnivore re-introduction. Carnivore re-introductions will succeed if they have the sympathy of the local populace. Citizens who were formerly poachers can be used as guards or rangers. Hunter support can be enlisted, assuming their initial antagonism has been allayed by facts (e.g. Canada lynx will not finish the deer because lynx feed on snowshoe hare). The general public can be enlisted as "wildlife watchers" reporting sightings to researchers. This style of wildlife management - one of intensified public participation - may result in a greater feeling of ownership toward the project by the local people. This approach is exemplified by the red wolf project (see below).

Re-introduced carnivores may kill livestock. They may roam a great distance from the release area. They may enter centres of human population. Therefore the most important factors for the survival of re-introduced carnivores may be socio-political: good communication and trust between the restoration team and the local populace, local agencies and local NGO's; and most importantly, the ability to be flexible enough to incorporate wildlife management techniques which address fears of the Big Bad Carnivore.

Lynx (Felis lynx) in New York State

The lynx was extirpated in the Adirondack region of New York State, USA, in the late 1800s. This region was heavily logged during the past century and forest disturbance created ideal conditions for white-tailed deer and bobcat (Lynx rufus), which rely on the deer as winter food. We hypothesize that the expanding bobcat population competed with Adirondack lynx in the last century, contributing to their decline. Other factors included trapping and incidental killing by humans. Today, deer and bobcat population are waning on unlogged lands as State forests are returning to near-climax conditions.
LARGE PREDATORS

A 1982 study found that lynx restoration was feasible in the Adirondack Park’s northeast sector, which is relatively free of deer and bobcats and which harbours a good population of snowshoe hares (Lepus americanus), principal prey of the lynx. We estimated that hare densities (170 hares/km²) would support a lynx population of 70 animals.

Lynx restoration by our team at the State University of New York, College of Environmental Science and Forestry, was conducted under permit from the NY State Dept. of Environmental Conservation and the United States Fish and Wildlife Service. A total of 83 animals were released during the three winters of 1988-1990. These were translocated from the Yukon Territory in Canada. All were fitted with radio collars and held for 2-4 weeks prior to release. The lynx were carried in groups of up to 5 animals to the release sites, and held at the release site (slow release) for 2-5 days. Each cage had enough food (frozen domestic rabbit) for the acclimation period. Release sites were chosen using computer-generated maps integrating topographic features, conifer cover, prey density and potential human interference.

Animals were radio-tracked from a fixed-wing aircraft whenever weather permitted, usually at intervals of 1-2 weeks. Out of 83 releases (48 females, 35 males), there have been 32 known mortalities. 12 were killed by vehicles, the largest single source of known mortality. Five died out-of-state usually by accidental shooting. Generally, mortality in-state has been low because of a good publicity programme; three lynx were raiding livestock pens. We lost six animals to miscellaneous causes. In one case, a young lynx was apparently killed by a large male lynx. There have been 334 reported sightings by the public; perhaps only one-third of these are valid.

No further lynx were released the past winter of 1991-1992. Rather we concentrated on tracking released animals. Transmittered animals utilised large areas (average 421 km² for females and 1760 km² for males). There is some evidence that breeding may have occurred as a male and female were in close telemetric association in several instances. However, we have no direct evidence of breeding. There have been unverified sightings of kittens. A feature of this restoration project has been good publicity and public education. Throughout the restoration, friendly press releases have built up goodwill for the project, and have even generated unsolicited donations of substantial public funding. We feel that this good publicity and support from diverse public interests in the state have contributed positively to the re-introduction.

Contributed by Rainer H. Brocke and Kent A. Gustafson

Red Wolves (Canis rufus) in N. Carolina

In 1987, the US Fish and Wildlife Service (USFWS) initiated a re-introduction programme designed to restore red wolves to the Alligator River National Wildlife Refuge in eastern North Carolina. This programme represents the first attempt in history to restore a predator that was extinct in the wild.

However, the Refuge is not being managed solely for red wolves, and hunting and trapping have not been curtailed because of the re-introduction. In fact, very permissive hunting and trapping regulations developed in 1985 have remained unchanged or made more lenient since the wolves were released. Currently, more than 99% of the Refuge is open to hunting (52% to hunting deer with chase hounds), and approximately 97% is open to trapping with regulation sized leghold traps and conibears. Not surprisingly, interactions between hunters, trappers, and red wolves in the Refuge have been common.

Laying the groundwork necessary to release the wolves was a difficult task, and hurdles involving local sportsmen and local and national environmental groups had to be overcome. Fortunately, there was no local livestock industry, so taking of livestock by wolves was not a major issue. During the early planning the USFWS decided that the released wolves would be designated as members of an "experimental/nonessential" population rather than members of an endangered population, giving the opportunity to relax restrictions of the Endangered Species Act in an attempt to encourage cooperation with restoration projects.

The process of designating a population as experimental/nonessential required that the USFWS hold public meetings to solicit opinions about the effect of hunting and trapping on the proposed re-introduction. The Executive Director of the North Carolina Wildlife Resources Commission expressed his agency's support so long as hunting and trapping were permitted in the Refuge. Defenders of Wildlife commented that the Service's finding that hunting and trapping would not jeopardize the wolves may have been premature, and suggested periodic reviews of this finding. The Humane Society and the Wildlife Information Centre commented that hunting and trapping should be prohibited in the Refuge.

The USFWS considered these comments, but held fast to its belief that hunting and trapping would not jeopardize the re-introduction. Indeed it felt that in the long run local sportsmen would be the wolf's greatest ally.

One concern voiced by local sportsmen involved the incidental taking of red wolves. It was recognized that a person engaged in lawful hunting and trapping might accidentally injure or kill a wolf despite the exercise of reasonable care.
The Service developed an incidental taking provision which stated that when a taking was unavoidable, unintentional, and did not result from negligent conduct, no prosecution would be undertaken provided that the incident was immediately reported to the Refuge Manager (or other authorized personnel).

At least five national environmental groups expressed support for the re-introduction, but objected to the incidental taking provision. They felt that it could be misconstrued. After reviewing the management plan, the Service reworded statements concerning incidental taking. However, the intent of the management plan was not changed.

Since 1987, a minimum of 52 wolves have been involved in the re-introduction project, which has been carried out through five hunting and trapping seasons. Deer hunters observed wolves on at least 30 occasions, and trappers captured three animals. Only one of these incidents resulted in the death of a wolf; a pup drowned after being captured in a leghold trap. The North Carolina Wildlife Resources Commission investigated the trap and determined that the set was illegal because the captured animal would be suspended above the ground. Their determination was upheld in district court. The trapper was found guilty of violating State trapping regulations and fined $65. Although the Service is conducting an investigation into the wolf's death, no federal charges have been filed.

Despite the wolf pup's death, the cooperation provided to the re-introduction project by hunters and trappers has helped ensure the success of the restoration. Similarly, cooperation from sportsmen throughout the nation will be necessary if other endangered species are to be restored to the American wilderness.

Protection of sport hunting and trapping within the Refuge is one of two factors prompting local cooperation with the re-introduction. The second is that most local hunters and trappers seem to believe that all living things, even "varmints" like wolves, have value. This attitude represents a shift away from the historical belief that wolves are a threat to humans and compete with sportsmen for game. Local sportsmen seem to understand that wolves aren't bloodthirsty marauders that kill children and decimate prey populations. Some indicated that they would support the re-introduction even if wolves killed enough prey to cause a drop in the numbers of animals shot or trapped. These sportsmen felt that the value of an outdoor experience should not be measured solely by the pounds of venison ending up in the freezer or the number of hides delivered to the furhouse.

Wolves require little to survive: woods to roam, prey to hunt, and freedom from harassment. Sportsmen in eastern North Carolina feel that this is a small price to pay for an experiment that represents a new chapter in wildlife conservation and a new chance for red wolves. Because of this respect and tolerance of a much misunderstood predator, the howl of the red wolf can once again be heard in the swamps of the Atlantic coastal plain. These sportsmen take to heart the words of Chief Seattle of the Suquamish, one of the nation's first great ecologists: "What are we without the beasts? If all the beasts were gone we would die from a great loneliness of spirit. For whatever happens to the beasts soon happens to us. All things are connected."

Contributed by Mike Phillips, USFWS.

South African carnivores

While translocations of ungulates in South Africa have reached the level where more than 20,000 animals are moved annually, re-introductions of carnivores have been far more limited and proportionally less successful. These re-introductions have been done primarily by the Conservation Agencies, rather than the private sector, and the aims have been to re-establish a component of the faunal diversity and to enhance the attraction of the area to visitors. Of the larger predators present in the region, only the spotted hyena (Crocuta crocuta) is yet to be translocated.

The first documented re-introduction was of lion (Panthera leo) into the Hluhluwe/Umfolozi complex in Zululand. Following entry of a nomadic male in 1958, two adult females and two female cubs were introduced in 1965. This was successful, and the population rapidly increased. The gene pool from which this lion population originated is very small; the adult females came from the same pride and were presumably related. It is also likely that when they formed a new pride with the male, he killed the two cubs. To date, no detrimental results of this probable "inbreeding" have been suspected.

Without a lion-proof fence it was inevitable that there would be conflict with pastoralists. Since the mid-1970's, the population has been managed at a level of approx. 100 animals. This management reduces the degree of dispersal, and the level of livestock killing (for which compensation is paid) is acceptable to neighbouring communities.

Two further lion re-introductions are in progress, both for less than a month so it is too early to comment on the outcome. However, in each case the use of electric fencing, implanted radio-transmitters and insurance against livestock losses due to lions, should enhance the chances of success.
All leopard (*P. pardus*) re-introductions have been into areas where leopard numbers had been so reduced that signs of the species were extremely rare. The animals were "problem" animals captured at least 200 km from the site of release. While there was no post-release monitoring, leopard signs and sightings are now commonplace in Mkuzi and Itala. In Songimvelo, leopard sign are encountered on a monthly basis, whereas previously spoor was recorded only once over a four-year period.

Cheetah (*Acinonyx jubatus*) introductions into Ndumu, Mkuzi and the Eastern Shores of St. Lucia were unsuccessful, in part due to lack of suitable habitat. Re-introductions to Pilanesburg, Suikerbosrand and Itala were regarded as being too successful in that rapidly increasing populations were having a significant impact on ungulate populations. As a consequence, cheetah were either controlled or removed. It has been speculated that absence of lion and spotted hyaena caused the rapid increase in the cheetah populations. The introduction of cheetah into the Kalahari Gemsbok and Kruger National Parks was to improve the status of the species which was perceived to be rare. The animals were "problem" animals captured in Namibia, and as the resident cheetah in both parks were at carrying capacity it is not surprising that there was no noticeable change in the status of the species. Despite ear-tagging, none of the introduced cheetah were re-sighted after release.

Re-introductions of brown hyaena (*Hyaena hyaena*) have been less than successful. They were absent for at least 40 years from the Umfolozi Game Reserve before the re-introduction was attempted. Spotted hyaena were numerous, and competition with these and with lion probably contributed to the failure of the project. The animals re-introduced to the Eastern Shores of St Lucia are known to have bred successfully, but their present status is unknown.

The first wild dog (*Lycaon pictus*) re-introduction into Hluhluwe/Umfholozi consisted of 6 pups and a pair of unrelated adults, all wild caught but held in pens for seven months. When the adults were introduced to the 4 month old pups, they regurgitated their last meal for the pups and adopted them. A few hours after release, the "pack" killed a wildebeest, indicating that the prolonged time in captivity had little effect on hunting ability. A second group was introduced in 1991 and joined the founder group. The population has fluctuated, at times reaching 40, and regularly leave the Reserve to range over 5000 km\(^2\) of tribal, ranching and agricultural land. The pack regularly returns to the Reserve for breeding in winter.

Most of these translocations (including re-introductions and introductions) can be regarded as unplanned experiments. An important point is that virtually all the animals involved were "problem animals" captured outside conservation areas. Had they not been translocated they would have been destroyed. The lessons learned confirm what would have been expected from recent studies on predator ecology. Perhaps the most useful experience of re-introducing large carnivores has been growth in confidence, to accept both the risk of failure and adverse public and media reaction. The successes have justified the chances taken, and it is certain that if Yellowstone National Park was in South Africa, wolves would have "re-appeared" years ago.

*Contributed by Jeremy Anderson, KaNgwane Parks Corporation.*

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>YEAR</th>
<th>PARK OR RESERVE</th>
<th>AREA KM(^2)</th>
<th>NO. ANIMALS INTRODUCED</th>
<th>OUTCOME</th>
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<tr>
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<tr>
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<td></td>
<td>1992</td>
<td>Venetia</td>
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Re-introduction updates

Black-footed ferrets free in Wyoming

The black-footed ferret (*Mustela nigripes*) re-introduction programme (see RE-INTRODUCTION NEWS No.1) has moved into a new phase. The captive breeding effort conducted by the Wyoming Game and Fish Department (WGFD) has been successful, allowing the programme to meet established goals: rapidly increasing population size; dividing the population (Henry Doorly Zoo, National Zoo Conservation and Research Centre, Louisville Zoo, Cheyenne Mountain Zoo, Phoenix Zoo, and Metropolitan Toronto Zoo); managing genetics of the population; participation in a Species Survival Plan under auspices of AAZPA; building the breeding population to 200 animals, and initiating re-introduction by 1991.

The re-introduction in September and October 1991 was a cooperative effort of the WGFD and the US Fish and Wildlife Service (USFWS) with assistance of the US Bureau of Land Management. Cooperation of private land owners was a key factor. The black-footed ferrets were re-introduced as a nonessential, experimental population under provisions of the Endangered Species Act.

49 animals were released in the Shirley Basin Area of southeast Wyoming. A soft-release technique was used based on recommendations developed at a 1990 re-introduction workshop. Participants of the workshop, who were involved in other re-introduction programmes, suggested release of 50 or more young of the year at one time, with on-site acclimation, provisioning and support to maximise survival, and intensive monitoring. Captive-raised ferrets were released at 18 weeks of age after being held in 1.2 x 0.9 x 0.8 m cages on site for 10 days. During the acclimation period they were fed Prairie dog (their natural prey) and food was provided after release for supplementation if the ferrets returned to the cages. 37 released animals wore telemetry collars and released individuals were monitored by telemetry, recording use of release cages, by spotlighting and recapture. Based on earlier studies of free-ranging black-footed ferrets, the mortality rate was expected to be as high as 80-90%. Re-introduction objectives were set at 20% survival for one month and 50% survival of remaining animals through the 1992 breeding season.

Most animals gradually abandoned the release cages during the first night. 17 returned to and occasionally used the cages up to 10 nights (av. = 3.3) post release. Approximately 83% of the telemetry-monitored ferrets remained within 300 m of the cage for at least 12 hrs following release. Based on the last known location of all released animals, 40 (82%) were located within 7 km of their cage. Release cages allowed recapture and veterinary treatment of four injured and/or malnourished animals. Six mortalities were documented through telemetry; these included coyote *Canis latrans* (5) and badger *Taxidea taxus* (1) predation.

A minimum of 12 (24.5%) black-footed ferrets survived the first month after release. The status of 30 (61.2%) individuals was not known at 30 days post-release. Presence of snow tracks, characteristic diggings, and sightings suggested at least 7 ferrets survived the winter (4-6 months post-release). Geographically, the partial winter count located these animals within a 4.5 km radius. The experimental re-introduction appears to have been successful, based on survival for one month and through the winter, and the affinity of surviving animals to the re-introduction site. In addition, much was learnt regarding re-introduction and monitoring techniques which will allow future modifications. An additional release of 80-100 black-footed ferrets is planned for 1992, perhaps at more than one site.

Contributed by Bob Oakleaf & Tom Thorne (RSG Section Co-Chair), WGFD, and Dean Biggins, USFWS.

Return of Biblical Fauna

Current and planned re-introductions in Israel so far include only mammals and birds. Mammal re-introductions are being carried out by the government conservation organisation, the Nature Reserves Authority (NRA). They have established two enclosed areas ("haibars") for captive breeding of ungulates.

Haibar Yotvata (13 km²) is situated in the south of the country, about 40 km north of Eilat. Most of the area has saline soils, supporting halophytes which are for the most part unpalatable. Some Acacias are found on a small sandy area, but they are overbrowsed. A parasite on the Acacias, *Loranthus acacieae*, is also heavily browsed. This haibar supported scimitar-horned oryx *Oryx dammah*, which bred successfully, and addax *Addax nasomaculatus* which did not breed well. However, as neither species was indigenous to the area, it was decided not to introduce them and they were distributed to local zoos.

The onager *Equus hemionus hemihippus*, mentioned in the Bible, is now extinct. The last specimens were killed by Bedu in the Syrian desert during a drought in the early 1930s. However individuals of the subspecies *E.h.onager* were donated by the Rotterdam Zoo in the 1960s and bred well; a few other individuals were imported directly from Iran. Unfortunately, these have become interbred with kulan (*E.h.kulan*) brought from a Dutch animal dealer. The hybrids are breeding well and appear to be able to utilise the halophytic shrubs. Re-introduction began in 1983 when the herd reached about 50. Five individuals, including a female with a radio-collar were transferred to an enclosure in Makhtesh Ramon (Wadi Ramon), a dry depression about 35 km long and 5 km wide, surrounded by steep mountains, about 70 km south of Be'er Sheva. Surface water from a natural spring was available.
Re-introduction updates

Two weeks later they were released from the enclosure and adapted well to the area. Further releases, of eight and seven individuals, took place in 1983 and 1984. There are now about 30 free-roaming onager-kulan hybrids. As the herd in the haibar continues to increase, another release is planned for this year in Nahal Faran (Wadi Djerasee), about 30 km south of the original re-introduction area. It has still to be seen whether the onagers will compete for food resources with the local dorcas gazelles, whose population has increased, under protection, to about 1500.

According to palaeontological evidence, another equid, similar to the Somali wild ass Equus africanus somalicus, used to occur in Israel. In 1972 some Somali wild asses were acquired from an Ethiopian animal dealer. For unknown reasons, perhaps related to diet, they did not fare as well as the onager-kulans in the haibar. No re-introduction is planned for the time being. The herd now numbers 18.

The Arabian oryx Oryx leucoryx occurred until the last century in southern Israel. 15 specimens were acquired from the Los Angeles Zoo. They are dependent on supplementary feed and are not breeding very well, although the herd now numbers more than 30. A re-introduction is planned this year in an area about 80 km north of Eilat, in an area with sandy soil and non-halophytic vegetation.

The extinct ostrich subspecies Struthio camelus syriacus survived in southern Israel until the 1920s. A number of N.African ostrich Struthio camelus were imported 20 years ago from Ethiopia. Although they bred well, there was heavy predation of eggs by Egyptian vultures (Neophron percnopterus) and chicks by foxes (Vulpes v. arabica). Hand-reared birds became inimical and eventually aggressive. Re-introduction will only be possible when these difficulties are resolved.

The second haibar was established by the NRA on Mt Carmel in a nature reserve with Mediterranean scrub forest and some remnant Aleppo pine. Here, animals are kept in small enclosures in which the native vegetation (including some rare orchids) is soon destroyed. Two species of deer once occurring in northern Israel have been introduced to the enclosures. Mesopotamian fallow deer Dama d. mesopotamica, which were obtained from Europe and Iran, breed well and there are now about 60 in the herd. No re-introduction is planned as it appears that the local vegetation may not provide suitable habitat. Roe deer Capreolus capreolus were also kept at this haibar; they were not the subspecies C. c. coxi which probably originally occurred in the area (and still occurs in Turkey). Breeding was poor and the last individuals perished in a forest fire.

A population of Cretan goat Capra aegagrus cretica is doing well, notwithstanding the fact that it originates from a single pair. Predation by jackals has been a problem, but if re-introduction takes place (none is planned so far) suitable cliff areas which would provide refuges from predators are found on Mt Carmel.

Raptor populations in Israel declined sharply during the 50's and early 60's due to pesticides. Vultures also decreased, perhaps due to diminished availability of carcasses. Plans for re-introductions of raptors are being initiated by Tel Aviv University (TAU) and the Society for the Protection of Nature in Israel (SPNI). The species involved include white-tailed sea-eagle Haliaeetus albicilla, lanner falcon Falco biarmicus taygete, griffon vulture Gyps f. fulvus and Negev lappet-faced vulture Torgos tracheliotus negevensis.

The sea-eagles come from zoo-bred stock (Vienna, Kansas, Frankfurt). A pair released in the Huleh Nature Reserve did not breed, but adapted well to freedom. The female was eventually found dead under a high tension pylon. A detailed re-introduction plan for the sea-eagle has been submitted to the NRA, but there has been no action yet.

In 1990 a re-introduction project financed by the Rothschild Foundation for the lanner got under way. Nine nestlings from the TAU Research Zoo were hacked from a hacking box in the southern area of Mt Carmel. There were no losses, and the birds learned to fly and catch prey and dispersed after 2 months. One of them was captured 150km south in Saudi Arabia, where it was trained for falconry. Another bird reappeared in the release area in March 1992. Further releases are planned for this year.

Griffon vultures are being bred successfully in local zoos and a breeding and release cage has been built in the Rothschild Foundation Reserve area on Mt Carmel. Releases are planned in the future. The Negev subspecies of lappet-faced vulture was only described in 1981. The Israel population, in decline from an estimated 25-30 pairs in 1945, faced extinction in the wild when the female from the last breeding pair was found dead in 1990. However, the captive population at TAU Research Zoo now numbers 13, including a breeding pair and two potential pairs (pair formation is a very prolonged process). A detailed plan for releases of this vulture has been submitted to NRA. There are plans to re-introduce other raptors in future.

Written using material supplied by Prof. H. Mendelssohn, Tel Aviv University.

Oryx & addax in Bou-Hedma N.P., Tunisia

In 1985, 10 young scimitar-horned oryx Oryx dammah (5 males, 5 females) from Edinburgh and Marwell Zoos in the UK were re-introduced into Bou-Hedma National Park, central Tunisia.
Re-introduction updates

At the same time, eight addax *Addax nasomaculatus* (4 males, 4 females) from Hanover Zoo, were released into the Park.

The re-introductions have been monitored by staff from the Direction des Forêts (DDF) in Tunisia and by members of the Zoological Society of London (ZSL). The most recent visit was in 1988. A full account of the release and subsequent monitoring can be found in Gordon, 1991 (*Ungulate re-introductions: the case of the scimitar-horned oryx. Symp. Zool. Soc. Lond.* 62:217-240). A private visit to the Bou-Hedma in 1991 by J.P. Gill provided an opportunity to catch up with developments since the last visit.

All the original re-introduced are still alive and there are now 21 oryx in the Park. No mortalities have occurred since two calves died in 1988. The herd has now split into four groups: the main herd of one adult male and five adult females, three subadult females, one subadult male and five calves; and three groups of males: two solitary males and one group of two. These males frequently interact with the main herd but are always driven off by the dominant male.

There are plans to re-inforce the oryx population in the near future and negotiations are under way between ZSL and DDF.

Due to intense interspecific aggression between male oryx and addax, resulting in the death of three addax (Gordon 1989, *J. Zool.* 218:335-337), a fence had to be established in 1988 dividing the Park into two and separating the two species. After the removal of the dominant male oryx the fence was dismantled, allowing the herds to interact.

During the 1991 visit by Gill, the addax herd consisted of one adult and two subadult males, ten adult females and four unweaned calves who frequently crèched together. One female was approaching oestrus, with a young calf at heel. This provided an opportunity to observe some unusual behaviour. A male oryx was closely associating with the addax herd, and with the oestrous female in particular. He threatened the three male addax, displayed flehmen, circling, laufschlag, and even attempted to mount the female. Copulation was not observed. Before and after these attempts the male addax were excluded from the vicinity of the oestrous female by the oryx, and stayed at least 5-10 metres away. (There were some weak attempts by one male addax to push the oryx bull away, but his playful pushing was no match for oryx horn-thrusts which can easily puncture the thin skin of addax).

This situation gives cause for concern as it may reduce the breeding success of the addax herd. There are plans to move the addax herd to another section of the Park which is out of reach of the oryx. An alternative plan is to move the addax to a national park in southern Tunisia more typical of addax habitat than the sub-Saharan Bou-Hedma.

On a more general note, the interactions between the oryx and addax in Bou-Hedma give warnings of the problems of releasing close congeners into a limited area especially where it is likely that there will be surplus males which attempt to develop consorts with females from another species. In the past, oryx and addax had largely different habitat requirements in their sub-Saharan and Saharan range, and such interactions would have been most unlikely.

There have been several other releases of ungulates into Bou-Hedma. The herd of eight dorcas gazelle (*Gazella dorcas*) released in 1988 has increased to 17. Recently five specimens of the rare dark form of dama gazelle (*G. dama mhorr*) had been received from an unspecified zoo. Unfortunately three of these died on transfer to the receiving pens from their transit crates. In 1989 zoo-bred Barbary sheep *Ammotragus lervia* were released into the Bou-Hedma mountain range which reaches 800m within the park. Nothing is known of the progress of this re-inforcement.

While there is certainly room for more oryx (Gordon 1991) in the Bou-Hedma N.P., any further re-inforcements will probably require even closer monitoring than before. This is especially important in the light of interactions revealed by this and previous visits.

Contributed by Iain Gordon, Macaulay Land Use Resource Institute, and Paul Gill, Edinburgh Zoo.