1990 IUCN Red List of Threatened Animals

Prepared by the

World Conservation Monitoring Centre
Cambridge, U.K.

In association with the
IUCN Species Survival Commission
and the
International Council for Bird Preservation

Guest Essay by
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FOREWORD

The Red List of species threatened with extinction is an international bulletin board alerting people to particulars of the diminishment of biodiversity worldwide. It is a very incomplete list, for, as Bruce Wilcox indicated in the last edition of the Red List, there are likely millions of inconspicuous species that are unclassified and that likely will be extinct before we know them scientifically. Nevertheless, the Red List and the Red Data Books of IUCN – the World Conservation Union, have served to stimulate many countries to assess the conservation status of their floras and faunas more extensively and completely. In response, laws and regulations to protect and conserve endangered species have been instituted nationally and internationally. There have also resulted more programmes to rescue endangered species under the protection of national parks, reserves, zoological parks, aquariums, and botanical gardens. And more habitat restoration and species reintroductions are now underway.

Yet catastrophic extinction waves are still before us if current practices and growth of human populations continue. The advent of a world convention or treaty on the conservation of biological diversity under the aegis of IUCN and the United Nations Environment Program is therefore a timely and much needed development to help stem the extinction tide. The member governments and organizations of IUCN should attend as rapidly and closely as possible to this opportunity to promote more effective conservation of living natural resources globally.

The principal users of this slim volume are no doubt already concerned or involved in aspects of species and habitat conservation. Yet all may not be aware of the complementary work of the IUCN to galvanize conservation efforts on behalf of Red List and other species. The reference here is to the Action Plan programme of IUCN's Species Survival Commission, which is a comprehensive scheme to specify the conservation status, priorities, and actions needed for many groups of plants and animals. Fifteen such plans by SSC Specialist Groups have been published, and several more are in preparation. Also in publication is a regional action plan for Sub-Saharan Africa compiled by Simon Stuart.

It is our hope that implementation of the SSC Action Plans can and will be followed by governments and non-governmental organizations, aided and assisted where possible by the SSC volunteer network of experts. Great encouragement of the overall Action Plan programme has been received this year through the Peter Scott Memorial Appeal. A generous gift from the Government of Oman will foster continuing preparation of the plans and first steps in implementation of those that have been completed. It is, of course, very fitting that Sir Peter Scott be remembered in this way, for he was the founder of the Species Survival Commission, the Red Data Books, and the Action Plan idea. There is a clear challenge to us to be as thoughtful and creative in continuing the work that he started.

In carrying on, the SSC has undertaken to re-examine the traditional categories used in classifying the conservation status of species. There is consequently now a study by Georgina Mace and Russell Lande examining extinction danger from the standpoint of population biology. There will be other studies relating to this question, including an attempt to rate extinction risks from causative human

acitivities. In this way, future Red Lists may become increasingly precise and compelling as they succinctly signal the condition of the world's heritage of species. Meanwhile, we must take up the cause of whole groups of species whose existence is suddenly imperilled – amphibians and sharks are immediate examples, with very different causational factors implicated.

Another approach to priorities in the conservation of biodiversity is identifying places rich in species and concentrating action on preservation and protection of these areas, labelled "hot spots" by Norman Myers. Recently, Russell Mittermeier has extended this idea to the political geography of the world and identified megadiversity countries that deserve focussed conservation attention. A suggested Green List of species important ecologically, evolutionarily, or economically may be another worthwhile venture. Such initiatives as well as the Red List are all valuable in reinforcing the message that people and their governments must act *now* if we are to conserve the world's natural heritage.

In closing, it is appropriate to acknowledge the extraordinary effort made by Jane Thornback in compiling this and previous Red Lists. It is also fitting to note that such labour and the expenses of producing the Red List, the Red Data Books, the SSC Action Plans, and related publications will be in vain unless conservationists of all kinds work to see that there are indeed adequate responses to the warnings of irrevocable losses of species that these publications provide. May this book's readers so commit themselves for the benefit of future generations.

George B. Rabb
Chairman, Species Survival Commission
IUCN, The World Conservation Union

INTRODUCTION

The *IUCN Red List of Threatened Animals* is a list of those taxa known by IUCN to be threatened with extinction. It complements the IUCN Red Data Books and the IUCN Species Action Plans, both of which contain more detailed information on the conservation status of species.

IUCN'S threatened animal list is compiled and maintained for IUCN by the World Conservation Monitoring Centre (WCMC) with the assistance of the International Council for Bird Preservation (ICBP). The list is published periodically. For each threatened taxon, the list includes its scientific name, english common name, IUCN threat category and a brief description of its distribution.

The threatened species list is based on information provided by numerous scientists and naturalists working in the field. The information may arrive at IUCN in the form of published and unpublished reports, books and correspondence. Much of the information is collated together by the Species Specialist Groups of IUCN's Species Survival Commission (SSC) and the Working Groups of the ICBP.

The threat category assigned to a species is determined by a review of the factors impinging on a species and the extent of the effect that these are having. Key factors that are examined include the change in distribution, change in numbers, degree and type of threat, population biology of the species and the level of conservation committment and resources that the species is likely to benefit from. Currently, IUCN is reviewing new methods of assigning species threat categories.

The number of threatened taxa identified by IUCN is just over 5000, comprised of 698 mammals, 1047 birds, 191 reptiles, 63 amphibians, 762 fishes and 2250 invertebrates. Except for birds, for which ICBP have now attempted a global review, these numbers represent only those taxa known by IUCN to be threatened. Many, many more taxa are threatened, many of them as yet undescribed by science. The number of taxa listed in the Red List is therefore only a fraction of the numbers it might be. Biodiversity in all its forms is being lost at a rate far exceeding that of any earlier extinction phase. Added to the major threats of habitat loss and overexploitation must now be added the impending threat of climate change. This will have a far reaching effect on conservation of biodiversity since the role of national parks and protected areas will be undermined especially with regard to plant and invertebrate conservation.

The IUCN threatened species list is constantly under review, with changes arising as new studies are undertaken or as previously unreviewed groups are examined by conservationists. Any relevant information on the status of species should be sent to IUCN or WCMC:

Red List Inventory
World Conservation Monitoring Centre
219c Huntingdon Road, Cambridge CB3 0DL
United Kingdom

Fax: 0223 277136

GUEST ESSAY

THE ROLE OF CAPTIVE BREEDING IN THE CONSERVATION OF SPECIES

Nathan R. Flesness and Tom J. Foose

We have borrowed the Earth from our children, and are defaulting on the loan. Their planet will have less ability to sustain life, and less ability to sustain wonder.

There is understandable disagreement as to just exactly how many million fewer species there will be. Whatever the total, whatever terms used to measure it, we are witnessing a very rare event – a large scale reduction in the life forms on Earth. Such a loss of *kinds* of life seems to have happened only a few times in the last billion years, perhaps associated with the rare and catastrophic collision of Earth and a large meteor. Now, of course, we are seeing the catastrophic collision of Earth with an unprecedentedly large and powerful human population.

With such grand and terrible events going on, with a scale in the millions, what is the possible role of captive breeding programs for one or two thousand species?

One answer comes from the non-random pattern of the extinctions we are seeing. Though we are losing many uniquely adapted mice species, "mice" as a broad guild of creature, will certainly survive the next century or two. So will fox and coyote, thanks in part to the mice. But the larger carnivores – the grizzly, the tiger, the lion, the condor, the crocodile and crane, need larger and wilder space. Most such species are or will be at risk. The large herbivores – the rhino, elephants, desert antelopes, etc. not only need large areas of habitat but are commonly eliminated by human activity even before their habitat is. High cash value wild plants, such as orchids or exotic tropical hardwood trees are disappearing because of excessive harvest, not herbivores. Life forms that are large, slow-reproducing, insular, specialized for climax ecosystems, or have high cash value of harvest, are much less likely to be a part of the future ecology of the planet.

Sadly, we will lose more species of mice in the future, but not all mice. The same is true a thousand-fold for beetles. But we may lose *all* the rhino, and many or most of the broad group of wild mammals over 25kg or so. Similar perspectives but with different thresholds apply to birds, herps, fish, invertebrates, and plants. Humans naturally have often interacted deeply with life-forms that are very visible (birds, for example) or are within an order of magnitude of our own size. Loss of any species is a tragedy, but the larger forms – the elephant, buffalo, wolf, crane, and so on, have played particularly important roles in human ecology and culture. Many such species are, have been, and could again become important economically when we finally and inevitably make the transition to a sustainable society. Moreover, many such organisms have a special role in the heritage of peoples, or are of special religious importance. Or, *in extremis*, as phrased by Bill Conway, "Are not some creatures so marvellous and so important to our concept of Earth that they should be preserved when all traces of their evolutionary homes are gone?".

Tabulations by the World Conservation Monitoring Centre indicate that 3.7% of the land area of the Earth is now protected. Most of the rest is or will be developed or managed for human purposes so intensively that biological diversity will be greatly reduced. Some of the 3.7% is protected only on paper, some of it is under visitor parking lots. Because our species reserves 96% of the land surface for our own direct utilization, we had best learn or relearn ways to retain diversity in these unprotected areas as well.

The emerging science of Conservation Biology has provided a crude tool – Population Viability Analysis – to help evaluate persistence probabilities of populations over time, and to help rank and quantify both the various risks to survival, and the impacts of potential protective measures. When this PVA tool is applied to problem species, the answer most often produced is that not enough "wild" is left, that the species of interest is at risk from a combination of deterministic and stochastic factors, and at greater risk than our intuition expected. Setting aside 3.7% of the earth to protect life in general will not suffice, especially for large and top-of-the-food-chain creatures. We *must* protect more habitat, but often there is none left to protect outside of existing reserves.

Most habitat protection has necessarily been opportunistic. Many protected areas are now being found inadequate for the longer term. Often the "flagship" taxon, in whose name the area was initially protected does not have a reasonable chance of surviving in the area over time spans of the next century or two.

So why captive breeding? Aldo Leopold answered this with a striking aphorism – "the first rule of intelligent tinkering is to save all the pieces". Human activity, or tinkering, scores dismally on this intelligence test. The sum total of all our conservation activities (enormously smaller than our development activities) is failing to save anywhere near *all* of the pieces. The stakes have come down to saving *some* of the pieces.

Captive breeding can buy time. Time to correct a management error, time to stop human over-exploitation, time even to practice restoration ecology and restore some habitats – for which you need the pieces (species). Surely, re-introduction science and restoration ecology will themselves continue to make progress. In the most desperate cases, captive breeding can preserve valuable and fascinating living monuments to a wild that once was – time for our descendants to at least marvel at life, not just stuffed and ageing skins. In better cases, captive breeding may help buy time by augmenting an ongoing "wild" population which is too small to have a good chance of persistence without supplementary reservoir of both individuals and genes. In other cases, extinction of wild populations will someday be followed by complete re-introduction from captive-bred and sustained populations. Such programs have been accomplished in the past and have an even better chance in the future now that serious science and science-based patience are applied.

Some of course disagree, arguing instead that species cannot or should not be maintained *ex situ*. Such views would deny preservation and conservation options to all future generations. It is hard not to see this as profoundly arrogant.

The world's two bison species are historical examples of the role which captive breeding can play. The American bison (*Bison bison*) were reduced by Caucasian settlement from an estimated initial 60,000,000 to less than 1,000 by 1889. The

magnificent animals that today roam several protected areas in the American West were re-established beginning in 1907 with stock intentionally bred for this purpose at the Bronx Zoo (a wild remnant population estimated at 200 did survive in the then-new Yellowstone National Park). The equally magnificent European bison, or wisent (*Bison bonasus*) was *completely* exterminated in the wild in 1921, but was bred in zoos starting from 12 animals in 1913. Zoo bred stock was successfully re-introduced in 1956 into the remaining wild – the Bialoweiza Park – on the border of Poland and the U.S.S.R, where these animals thrive today.

Another important historical example is the Mongolian wild horse (*Equus przewalski*). A zoo population was established 1898-1900, with one additional wild-caught animal added in 1947. The species subsequently became extinct in the wild. Plans for re-introduction from zoo stock are now developing in Mongolia, China, and the U.S.S.R. What remains of this species has been sustained in captivity for as many as 14 generations.

In more recent years, two major improvements have occurred in the application of captive breeding to species preservation and conservation problems. One advance is the development and application of serious science to the re-introduction process. Though early efforts were occasionally successful, as mentioned above, most re-introductions were very casual in methodology and very mediocre in results. Modern approaches are exemplified by the Arabian oryx (*Oryx leucoryx*) which was hunted to extinction in the early 1970s but rescued by zoo-based captive breeding, then very successfully and scientifically re-introduced into Oman with the sponsorship of the Omani royal family under the leadership of Mark Stanley-Price. This species has since been re-introduced into another part of its original range, in Jordan. These experiences have led to an active IUCN/SSC/Re-introduction Specialist Group. Similarly serious scientific approaches are being taken in planning re-introductions of both the California condor (*Gymnogyps californianus*) and the Black-footed ferret (*Mustela nigripes*). Both of these are now extinct in the wild. After controversy delayed capture of the last several wild individuals of each, both are now successfully breeding in captivity. The high fecundity ferrets should be back in the wild less than a decade after their extinction. Captive breeding is being applied in numerous other cases as one tool to help in re-establishing species in areas from which they have been extirpated.

The second major advance is the development of cooperative national, regional, and international conservation management plans for zoo populations of important taxa. From early beginnings in the Anthropoid Ape Advisory Panel and Joint Management of Species Group in the United Kingdom and the development of the Species Survival Plans (SSP) by the American Association of Zoological Parks and Aquariums a decade ago, these cooperative captive conservation programs have expanded to include the Europaiesches Erhaltungszucht Program (EEP) program in zoos in Europe, Species Management Program (SMP) in Australasian zoos, developing programs in the Japanese Association of Zoological Gardens and Aquaria, and elsewhere. Over 150 taxa of all classes of vertebrates as well as the invertebrate genus Partula (endemic land snails of Moorea, now extinct in the wild) are now managed cooperatively by groups which total about 400 institutions (about half of the world's recognized zoos and aquariums). These programs use detailed population datasets (both individually-compiled studbooks and the International

Species Information System (ISIS) zoo database network) and contemporary population-and-conservation-biology analysis to support explicit conservation goals. Prime goals are retention of genetic diversity and maintenance of demographic stability (at the right time, generation of surplus for re-introduction). New programs, and coordination and linkage of existing national and regional programs, are being developed through the very active IUCN/SSC/Captive Breeding Specialist Group.

IUCN has already recognized the logic and contributions of captive breeding in the published IUCN Policy Statement on Captive Breeding, 4 Sept. 1987. This document makes the important point that captive breeding programs should be initiated when the wild population is still in the thousands. All too typically, as in the ferret and condor cases, captive options have been resisted until the wild population is less than 20(!), genetic erosion has already begun, the population is at maximum risk and there is no room or time for error, or for learning captive husbandry requirements.

Captive breeding is likely to buy time mostly for megafauna and attractive flora, as there are pre-existing institutions (and publics) interested in them and increasingly dependent on their propagation. Zoological gardens worldwide plan to expand from the 150 species now involved in multi-institution coordinated breeding programs, to perhaps 1,000 species. Botanical gardens are developing programs which may match or exceed this number.

Beyond the fact that the megafauna as a whole is uniquely threatened, captive propagation itself has disproportionate impact. The reasons are multiple:

- The public cares, and cares most about what it can see close to home. This care can be mobilized over time to change laws to better protect habitats and their occupants, protect more areas, even start habitat-restoration projects. Zoological and botanical exhibits of living creatures contribute substantially to nurturing emotional bonds between wild species and urban humans. Captive breeding of species at risk draws further powerful attention – people see the threatened "flagship" creature or plant in television or printed news media and can often go see it in person (or live on videocamera) at the nearby breeding zoo or garden. We are in the early stages of learning to harness this resource, but such attention has already been used to change detrimental laws (Bison, Black footed ferret), acquire and protect new habitat areas (Red wolf, innumerable Nature Conservancy areas) and even start ecosystem restoration projects (Round Island, Mauritius, St Helena).
- The megafauna has large ecological impact. Even though other taxa may have higher total body mass per hectare, megafaunal species often have major effects on succession and patchiness of habitats. If we don't save these pieces for future restored ecosystems, we may have to build robots to emulate their "keystone" roles.
- The megafauna requires the most room. Mobilizing public interest in them generates pressure for adequate wild habitat – areas large enough to operate as at least partially functional ecosystems and large enough to protect innumerable other taxa which can quietly thrive under their megafaunal "umbrella".

It is imperative that zoological and botanical institutions and other specialized facilities continue to increase their focus on threatened taxa.Broad scale review of taxa in need of captive propagation, institutional holdings and capacity, and demonstrated captive-breeding competence, is now being carried out as an integral part of the development of IUCN/SSC Action Plans. The collective zoological capacity is about 560,000 live specimens (International Zoo Yearbook, Vol. 26). Considerable collective competence with thousands of species is in hand. For example, ISIS data indicate that 92% of new zoo mammals are bred in captivity. Captive propagation facilities are developing, and must sustain, genetically and demographically sound captive-bred populations of hundreds, perhaps thousands, of wisely selected taxa. This role is well beyond that imagined when most of these institutions were established, and is beyond that even understood today by many of their funding sources. Nevertheless these programs are making increasingly real contributions to preserving some of the Earth's living heritage.

There will not be a single solution to the biodiversity crisis – it is simply too overwhelming. With luck there will be lots of little answers, each tapping different resources not available to the others, each contributing different pieces to a patchwork solution. This 1990 IUCN Red List identifies species known to be of special concern. Surely we want the readers of the 2000 IUCN Red List and the 2100 IUCN Red List, to find very few additional species marked Ex-extinct. In increasingly many cases, captive breeding is the only way we can keep this from happening.

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Trichechus senegalensis	West African Manatee	V	West Africa
Order PERISSODACTYLA			
Family Equidae			
Equus africanus	African Wild Ass	E	North-east Africa
Equus grevyi	Grevy's Zebra	E	Ethiopia, Kenya, [Somalia]
Equus hemionus	Asiatic Wild Ass	V	Asia
Equus hemionus hemippus	Syrian Wild Ass	Ex	[Syria]
Equus hemionus khur	Indian Wild Ass	E	Pakistan, India
Equus przewalskii	Przewalski's Horse	Ex?	Mongolia, China
Equus quagga quagga	True Quagga	Ex	[South Africa]
Equus zebra hartmannae	Hartmann's Mountain Zebra	V	Angola, Namibia
Equus zebra zebra	Cape Mountain Zebra	E	South Africa
Family Tapiridae			
Tapirus bairdii	Central American Tapir	V	Central & North-west South America
Tapirus indicus	Malayan Tapir	E	South-east Asia
Tapirus pinchaque	Mountain Tapir	V	North-west South America
Family Rhinocerotidae			
Ceratotherium simum cottoni	Northern Square-lipped Rhinoceros	E	Zaire, S. Sudan
Diceros bicornis	Black Rhinoceros	E	Africa
Didermocerus sumatrensis	Sumatran Rhinoceros	E	South-east Asia
Rhinoceros sondaicus	Javan Rhinoceros	E	Java (Indonesia), Vietnam
Rhinoceros unicornis	Great Indian Rhinoceros	E	India, Nepal
Order ARTIODACTYLA			
Family Suidae			
Babyrousa babyrussa	Babirusa	V	Sulawesi, Buru, Sulu & Togian Is (Indonesia)
Sus barbatus cebifrons	Visayan Warty Pig	V	Visayan Is (Philippines)
Sus barbatus oi	Western Bearded Pig	V	Malaysia, Indonesia
Sus salvanius	Pygmy Hog	E	[Bangladesh], India, Nepal

Sus scrofa riukiuanus	Ryukyu Islands' Wild Pig	V	Ryukyu Is (Japan)
Sus verrucosus	Javan and Bawean Warty Pigs	V	Java & Bawean I. (Indonesia)
Family Tayassuidae			
Catagonus wagneri	Chacoan Peccary	V	Argentina, Bolivia, Paraguay
Family Hippopotamidae			
Choeropsis liberiensis	Pygmy Hippopotamus	V	West Africa
Family Camelidae			
Camelus bactrianus	Wild Bactrian Camel	V	Mongolia, China
Vicugna vicugna	Vicuna	V	Andes
Family Cervidae			
Axis calamianensis	Calamian Deer	V	Calamian I. (Philippines)
Axis kuhli	Kuhl's Deer	R	Bawean I. (Indonesia)
Blastocerus dichotomus	Marsh Deer	V	Central America
Cervus albirostris	Thorold's Deer	V	China
Cervus alfredi	Visayan Spotted Deer	E	Visayan Is (Philippines)
Cervus duvauceli	Swamp Deer	E	India, Nepal
Cervus elaphus bactrianus	Bactrian Deer	E	Afghanistan, U.S.S.R.
Cervus elaphus barbarus	Barbary Deer	V	Algeria, Tunisia
Cervus elaphus corsicanus	Corsican Red Deer	E	[Corsica (France)], Sardinia (Italy)
Cervus elaphus hanglu	Hangul	E	India
Cervus elaphus macneilli	Mc'Neill's Deer	I	China
Cervus elaphus wallichi	Shou	E	China, Bhutan
Cervus elaphus yarkandensis	Yarkand Deer	E	China
Cervus eldi	Thamin	V	South-east Asia
Cervus eldi eldi	Manipur Brow-antlered Deer	E	India
Cervus eldi siamensis	Thailand Brow-antlered Deer	E	South-east Asia
Cervus nippon grassianus	Shansi Sika	Ex?	China
Cervus nippon keramae	Ryukyu Sika	E	Ryukyu Is (Japan)