# *Setting the Thresholds of Potential Concern for Species of Conservation Concern*

## Relation to KNP objectives

The KNP's Threatened Biota Objective is : "to prevent extinction within the Kruger Park of any species on the IUCN's global critically endangered or endangered lists[1], and to work with other conservation initiatives to secure and strengthen the future of such species over their historic distribution ranges. To put in place appropriate monitoring and conservation efforts of other threatened[2] species or lower taxonomic division[3], including considering recommendations of experts of invertebrate taxa for which no formal red-listing has been done, according to a realistic framework. Except in crucial instances for the survival of globally critically endangered species, management for system integrity and biodiversity must take precedence over species management."

[footnotes: [1] Until such time as the plants have been assigned the latest IUCN criteria they will be evaluated on the old system; [2] Threatened includes critically endangered, endangered and vulnerable according to IUCN classification; [3] Includes sub-species, variant or population]

The KNP recognizes that it is imperative that a realistic framework of threat for the various biota is established in order to allocate resources sensibly and according to priorities. To this end, species of concern have been subjected to a ranking procedure according to certain pre-defined criteria (or where the scores for these are unknown or unavailable, this is done on the advice of experts) and then classified into categories (red, candidate amber, amber and grey). This has been achieved for mammals and birds and to a greater or lesser degree for plants, reptiles and amphibia.

## Rationale

Rare species have traditionally been defined as those species with restricted distributions or species that occur at low densities (Gaston 1994), while the Red Data concept (IUCN 1994) encompasses an assessment of species rarity and/or population vulnerability. This often forms the basis of regional and even international species-specific conservation actions, underpinning the requirement to afford some species special conservation status and therefore focusing conservation actions. Many such assessments, however, are based on scale-invariant global evaluations of a species, and have in the past resulted in national or regional initiatives focusing on globally identified priority species. While this is understandable in terms of the charismatic appeal of such species, and these species have benefited substantially from international efforts (e.g. African elephant and rhino), the broader regional biodiversity conservation needs and goals may have been neglected in the process.

As a member of IUCN, SANParks has a commitment to supporting the IUCN Species Survival Commission in its endeavours to prevent species extinctions due to anthropogenic causes. This will, however, be done in support of the biodiversity values to which SANParks subscribes, namely that we

Ø adopt a complex systems view of the world while striving to ensure the natural functioning and long term persistence of the ecosystems under our care.

Ø aim at persistent achievement of biodiversity representivity and complementarity to promote resilience and ensure ecosystem integrity

Ø can intervene in ecosystems responsibly and sustainably, but we focus management on complementing natural processes under a "minimum interference" philosophy.

Ø accept with humility the mandate of custodianship of biodiversity for future generations while recognising that both natural and social systems change over time.

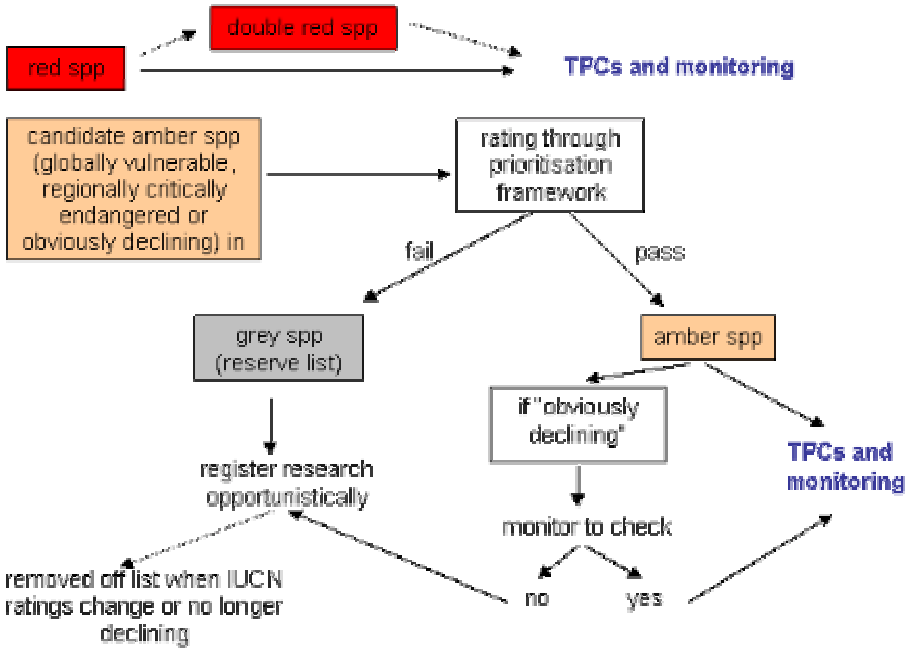
Recognising that the maintenance of biodiversity in all its facets and fluxes is a prime ecological objective in most national parks, allocation of time and resources for species conservation is permissible. Freitag &

Van Jaarsveld (1997) argue for rational prioritisations of species-specific conservation actions that are representative of regional biodiversity conservation requirements, highlighting the effect of scale in such assessments.

SANParks will therefore strive to prevent extinction, within National Parks, of species on the IUCN's global critically endangered or endangered lists[1], and will work with other conservation initiatives to secure and strengthen the future of such species over their historic distribution ranges. Where appropriate, we will further strive to put in place appropriate monitoring and conservation efforts for other threatened[2] species or lower taxonomic division[3] (considering recommendations of experts for invertebrate taxa for which no formal red-listing has been done) according to a realistic prioritisation framework. However, except in crucial instances for the survival of globally critically endangered species, management for system integrity and biodiversity must take precedence over species management."

SANParks recognizes that it is imperative that a realistic prioritization framework is established in order to allocate resources sensibly and according to priorities. To this end, species of concern will be subjected to a relative ranking procedure according to pre-defined criteria (or where the scores for these are unknown or unavailable, this is done on the advice of experts) and then classified into categories (red, candidate amber, amber and grey). This transparent, rational framework enables categorisation of species according to importance ranking for monitoring and possible management attention in national parks.

SANParks' approach in determining which species should be prioritized for monitoring and the setting of thresholds (TPCs) to evaluate population well-being is described in the flow diagram below. Emphasis in only on species which are native to both South Africa and the specific national park in question. All species which are globally critically endangered or endangered are classified as "red" and will automatically qualify for attention through the setting of TPCs and appropriate monitoring. Those "red" species which are confined in their distributions to SA national parks are termed "double red" in recognition of SANParks' sole global custodianship role for these species. "Candidate amber" status is assigned to species that are considered globally vulnerable or regionally critically endangered, or species which are 'obviously declining' in a national park.



The prioritization framework is designed to determine a relative importance ranking for species within a specific national park (but may also be applied across the SANParks estate) so that monitoring and management efforts can be appropriately allocated. The framework is based on the following criteria:

| Criterion | Scale at which measured | Scoring system | Rationale |
|---|---|---|---|
| Vulnerability according to red-listing | global | 0=not assigned, 2=candidate amber, 3=red | A measure of relative global vulnerability based on IUCN global assessments of vulnerability. This should in future be modified to reflect a greater emphasis on regional vulnerability. Species (or lower taxonomic groupings) are assigned "red" status if they are globally critically endangered or endangered. "Candidate amber" status is assigned to species that are considered globally vulnerable or regionally critically endangered, or species which are 'obviously declining' in a park. This criterion is a measure of SANParks commitment to species of international concern in line with our obligations under various agreements. |
| Role in ecosystem | park* | 1=low, 2=medium 3=significant | This is a subjective evaluation of the 'keystone-ness' of a species within a specific ecosystem. |
| Relative endemicity | global (but realistically mainly considering Africa) | 1=widespread even beyond southern Africa, 2=southern African endemic 3=endemic to park or region | The relative endemicity score reflects consideration of a species in a wider regional context to allow ranking species in terms of their dependence in natural distribution on the park for survival. |
| Extent of occurrence | global (but realistically mainly considering Africa) | 1=marginal in park, 2=in range, but limited suitable habitat in park, 3=in range and good habitat in park | Extent of occurrence scores take into account wider distributions of species and assign higher scores to those species that are well within their ranges and where parks offers good habitat. This brings the broader context of each species' distribution into consideration (Hunter & Hutchinson 1994). We wish to avoid artificially inflating relative importance of locally rare species (also termed "pseudo rare" by Rabinowitz (1981)) which merely reflect peripheral populations of otherwise widespread species restricted to isolated patches of suitable habitat at the outer edges of their ranges (Brown 1984) |
| Importance of park for the survival of the species | global | 1=low, 2=med, 3=high | This is a multi-faceted subjective rating based on the perceived importance of the park for the survival and/or persistence of the species. It incorporates elements of the endemicity evaluation (ie how restricted is it is in its distribution) as well as elements of the 'nature of threat' evaluation. |
| Taxonomic distinctiveness | global | 1=all, 2=monospecific | Taxonomic distinctiveness here coarsely incorporates an evaluation of the degree of genetic distinctiveness between |

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| | | genus, 3=monospecific order or family | species (Crozier 1992, Freitag & Van Jaarsveld 1997). Our crude approach (vs. one based on comprehensive phylogenetic trees e.g. Williams et al 1994, Vane-Wright et al. 1994) aims at providing an indication of taxonomic rarity based on giving taxa with fewer existing relatives higher value than those with many conspecific relatives. |
| Genetic threats (inbreeding / hybridisation) | park* | 3=high chance of inbreeding or hybridization<br>0=none | Recognises that rare and low density species are more vulnerable than common, high density species (Wheeler 1988) and are therefore more likely to be affected by genetic and demographic influences and most likely require a higher level of management (Rebelo 1994). This criterion cross-references the vulnerability criterion, but is evaluated on a local scale. Low density and/or restricted range species are usually plagued by limited distributional information and greater sampling error (Siegfried & Brown 1992, Gentry 1992). |
| Susceptibility to illegal harvesting | regional / park* | 3=highly sought-after (incl medicinal value);<br>2=medium susceptibility;<br>0=none | A subjective measure of how sought-after a species is in terms of economic value and/or medicinal value. Will need expert inputs. |
| Tourism (economic) value | park* | 3=high expectations and image; 2=medium; 0=none | This measure recognises the importance and high profile of charismatic species, particularly in the context of tourism expectations per park. |
| Nature of threat / chance of success (reversibility) | park* | 3=reversible, high chance of success;<br>2= threat difficult to reverse; 1=threat very difficult to reverse and limited chance of success | A park-specific measure which provides an indication, based on best available knowledge and expert opinion, of what chance of success there is of species-specific conservation actions being appropriate and effective. |
| Logistical capacity (to raise funds, staff, etc) | park* | 3=good capacity to raise funds, staff, infrastructure<br>0=limited capacity | The measure is partially correlated with the tourism value and historical investment criteria. The measure is intended to provide an indication of availability (or ease of acquiring) logistical support for species-specific conservation efforts |
| Historical investment / momentum | park* | 3=significant resources already invested;<br>0=none yet invested | This score is relative and suggests capitalizing on past efforts. It must however be borne in mind that we may reach a point when we might have to cut our losses rather than perpetuate the significant investments of the past with little chance of positive returns |
| Success of park's historical conservation efforts potentially negatively | park* | -12=hugely successful with possible negative influence on other elements of biodiversity<br>-6=intermediate or | This criterion recognizes that in cases of extremely successful (historical) species-specific conservation action in a park, this can be to the detriment of local biodiversity (in terms of structure, composition and function) and system integrity. This measure carries a maximum negative score of -12 to provide a counter-balance to the other twelve measures, where significant. |

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| affecting other species or biodiversity elements | | probable effects;<br>0=none | |

* or may be evaluated across SANParks

The scores for the above criteria are then summed, with all criteria given equal weighting, and converted to a percentage (calculated as the score for the species out of the highest possible total score). This simple summation method was tested against a variety of weighted measures (e.g. giving biodiversity criteria higher weightings than others, or giving biodiversity and tourism scores a 2x or 3x inflation) and was found to result in similar prioritizations with some relatively minor switching of places within the top-scoring species in the Kruger National Park. The equal-weighted summation of continuous variables is considered the least convoluted, most easily understandable and interpretable approach for identification of regionally important species (Freitag & Van Jaarsveld 1997).

It is proposed that a relatively arbitrary cut-off point along the continuum of percentage scores (e.g. x%) is selected such that species which score ≥ x% in the evaluation are considered amber species and are thus required to have TPCs developed and appropriate monitoring put in place until such time as they "fall off" the amber list (by scoring <x%) as the species becomes of less conservation concern in the park under consideration, or across SANParks. As new species are added to the 'candidate amber' list, either through changing red-listing threat status or due to significant reason to believe that they may be obviously declining in a park or across the SANParks estate, these are evaluated and ranked through the process outlined above and either make the amber list (if they score ≥ x%), thus requiring dedicated attention (through monitoring to measure set TPCs) or are moved to the 'grey' list.

Availability of resources will influence the extent to which SANParks can and will entertain species-specific conservation efforts, and it is anticipated that a SANParks-wide evaluation is undertaken to prioritise corporate spending on species efforts.

Metapopulation Management of Species of Species of Conservation Concern

Many species occur today in a number of geographically separated small 'subpopulations'. A population made up of separated subpopulations is referred to as a 'metapopulation'. In historical times individuals would have moved periodically between subpopulations, promoting an exchange of genes, thereby maintaining genetic heterozygosity. Given the fragmentation of habitats imposed by human development, natural immigration and emigration are no longer possible, and subpopulations may be subject to loss of genes and inbreeding depression. In such cases it is necessary to promote the introduction of 'new blood' by bringing in new breeding individuals at intervals. Examples of Red List species which SANParks currently needs to manage as 'metapopulations' are black rhinoceros and Cape mountain zebra. Population models which estimate likely loss of genetic heterozygosity give guidelines on the desirable rates of exchange of individuals. A general rule of thumb is that one new individual should be brought in every generation, provided that the individual breeds successfully.

# *TPCs*

The species-specific TPCs for KNP red species have thus been set, and these invoke appropriate monitoring programs. The candidate amber species once scored using the framework will have TPC's and monitoring programs developed.

Table 3. TPCs for rare species

| Species | Categorisation | TPC called | Rationale for TPC |
|---|---|---|---|
| Lycaon pictus (wild dog) | Red | When population declines to less than 12 packs for the entire KNP<br>and/or<br>if median pack size falls to 6 or less. | Genetics models suggest that a minimum of 9 packs is required for a genetically viable population.<br>There is evidence from field studies that packs of under six dogs are unable to raise pups and likely to go extinct |
| Diceros bicornis (black rhino) | Red | any non-increase in population growth rate between any two surveys | In progress |
| Adenium swazicum | Red | A >5% decrease in the population between any two surveys<br>For 3 or more years the population size/age classes are skewed, with little or no sign of normalization<br>The geographic distribution of sub-populations decrease by 5% or more<br>If ≥5% of reproductive individuals have been impacted on which has detrimentally affected regeneration | population decline (decreases in number of individuals) in the field between surveys – must be linked to things like time to first flowering or generation time to determine how far apart surveys should be in time. Feeling was that scaling needs to be set per plant spp based on such criteria. |
| Siphonichilus aethiopicus | Red | Same as Adenium swazicum | population decline (decreases in number of individuals) in the field between surveys – must be linked to things like time to first flowering or generation time to determine how far apart surveys should be in time. Feeling was that scaling needs to be set per plant spp based on such criteria. |

Some of the 'grey' mammals and birds are/have received greater or lesser amounts of attention, but decisions on monitoring and research on these and other biota need to be finalized.

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