CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

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Interpretation and Implementation of the Convention

Trade in Leopard Skins

REPORT ON THE STATUS OF THE LEOPARD IN SUB-SAHARAN AFRICA

1. The annexed document is an abbreviated version of the report presented to the Secretariat by R.B. Martin and T. de Meulenaer on the survey they have conducted, as consultants of the Secretariat, on the status of the leopard (Panthera pardus) in sub-Saharan Africa.

2. The whole report, in draft form and in English only, will be distributed to heads of Delegation in Ottawa. Additional copies will be available to other interested participants at the cost of reproduction. The Secretariat will publish the final version of this report as soon as possible after the meeting.

3. The project under which this report was prepared was funded by the Safari Club International and the American Fur Institute and the Secretariat wishes to acknowledge these valuable contributions with thanks. The Secretariat also wishes to express its gratitude to the Government of Zimbabwe for allowing Rowan Martin to undertake this project, and to thank the authors of the report for their excellent work and for providing such comprehensive and incisive insight into the subject. The Secretariat believes that this report marks a major milestone in the study of conservation and rational utilization of wildlife and that it provides the necessary basis on which to make the decisions associated with the CITES status of the African leopard.

4. The report represents the views of the authors and not necessarily those of the Secretariat.

ABBREVIATED VERSION

SURVEY OF THE STATUS OF THE LEOPARD (Panthera pardus) IN SUB-SAHARAN AFRICA

Report to the CITES Secretariat

by

R.B. Martin and T. De Meulenaer

1st April, 1987

CONTENTS

TERMS OF REFERENCE

(i) To collect and collate the best available data relating to the status and distribution of the leopard in sub-Saharan Africa.

(ii) To collect and analyse recent historical data relating to conservation and exploitation status, in order to assess changes in the number of leopard killed.

(iii) To assist individual governments, if appropriate, by providing an outline management plan for utilisation/protection of the species.

(iv) To make recommendations as to how the species in sub-Saharan Africa should be protected or exploited in connection with CITES.

The project was undertaken from 1 November 1986 to 31 March 1987, during which period we visited Benin, Botswana, Burundi, Cameroun, Central African Republic, Congo, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Malawi, Rwanda, Sierra Leone, Somalia, South Africa, Sudan, United Republic of Tanzania, Togo, Uganda, Zaire, Zambia and Zimbabwe. Owing to the limited period for the survey it was not possible to spend more than 2-7 days in each country.

ACKNOWLEDGEMENTS

In this short report it is not possible to do more than thank the official wildlife agencies, private individuals and personal friends in each of the countries we visited for the meetings, assistance and hospitality. A full list of acknowledgements appears in the main report.

1. STATUS AND DISTRIBUTION OF LEOPARD

1.1. A POPULATION MODEL FOR LEOPARD

One of the objectives of this consultancy was to advise wildlife agencies in each country on the management of leopard. We constructed a population model to simulate the effects of various types of exploitation. Most of the results of this modelling apply to sections 2 & 3 on harvesting and management, but one outcome is so fundamental to understanding the status of leopard that it needs to be introduced at the outset.

Given an area of natural habitat with prey present, a leopard population left to its own devices will stabilise at some saturation density. To simulate this we have used a modified Leslie Matrix birth-pulse model in which density dependence is achieved through a classical feedback control system operating on the survival of the population.

The model falls into the category of the "Complete Compensation Model" defined by Caughley (1985). In this type of model, population size is unaffected by harvesting unless the rate of offtake exceeds some threshold. In the majority of animal populations it is doubtful if this could occur, but it appears appropriate for certain large territorial carnivores. It explains a great deal of the commonly heard statements on the resilience of leopard populations. It requires the presence of a "shadow" population which is normally subject to high mortality in the form of transient males dispersing and cubs being killed by dominant males. When the territorial animals are removed this shadow population rapidly replaces numbers.

We have used the complete compensation model to test the effects of various types and levels of harvests on leopard populations. We find that either leopard populations can sustain the harvest to which they are being subjected, in which case their numbers remain the same, or they cannot - in which case they go extinct. The corollary to this model is that, if leopard are present in an area, **then they are at the saturation density**. This is a bold statement and it needs qualifying.

Occam's Razor would suggest that it is asking too much to postulate that over a wide area many leopard populations are in a parlous state of decline to extinction. The model predicts that any population being harvested at a rate which will result in extinction gets there very fast. We have little doubt there are many leopard populations which have been subjected to harvests beyond the sustainable level. But what would tend to happen in cases like this is that such a harvest could not be sustained up to the point of extinction. The effort required to produce a large offtake when the population is low becomes prohibitively high and it is not economic to continue. Having been once reduced, the population may be kept at a low density by sporadic harvests which prevent its recovery to its original saturation level, but as soon as the pressure is lifted, the population will recover rapidly.

The complete compensation model casts serious doubts on the sort of report which claims that, although it is impossible to count leopard, they are declining in a large number of areas.

The first requirement of this consultancy was to examine status. **The status of leopard, wherever they occur, is such that they are at the maximum number at which they could occur:** that, or they are on the path to extinction.

1.2. LEOPARD NUMBERS

There is no practical method to count leopard directly on any large scale. We have relied on an indirect method based on the relationship between leopard densities, rainfall and habitat types.

> "One expects animals to live at higher densities in richer and more productive habitats than they do in marginal and unproductive ones; and there is no reason to doubt that food is for most species the ultimate determinant of population density." (Wynne-Edwards, 1970, p425).

Predators are ultimately limited by their food resources. Whilst density dependent carnivores may use territory as a proximate regulating mechanism, the causal factor is food supply (Murray, 1979, p45 & p68). Sunquist (1981, p52) states that the major factor influencing home range sizes (and hence density) for tigers lies in the seasonal distribution and abundance of prey. Schaller (1972, p368) refers to prey populations regulating the density of predators in the Serengeti.

Other factors obviously influence density. Seidensticker et al. (1973, p53) conclude that the density of mountain lions depends on vegetation, terrain, prey numbers and vulnerability to factors which affect successful breeding. The presence of other predators also has an effect. Where tiger and leopard co-exist in Royal Chitawan Park, Seidensticker (1976) notes that it is not only the abundance of prey which influences predator numbers but also the size distribution of prey. The regulatory effect of food shortages may also take a long time

to affect predator populations. Gasaway et al. (1983, p32) note that when prey populations are reduced it may take timber wolves several years to respond to the shortage.

The relationship between herbivore densities and rainfall in Africa is well established. Coe, Cumming and Phillipson (1976) showed a straight line regression between rainfall and herbivore biomass for a wide range of habitats in Africa. East (1984) developed this relationship further for individual herbivore species in savanna habitats and established a positive correlation between carnivore biomass and rainfall. We have developed a regression between leopard density (numbers/sq.km.) and rainfall (cm.) based on 23 reliable estimates:

$$\text{Log (Density)} = -8.344 + 1.342 \times \text{Log (Rainfall)}$$

The relationship can be expected to be influenced by the amount of suitable habitat for leopard. We have used Mackinnon & Mackinnon's (1986) breakdown of the original areas of the vegetation types defined by White (1983) for each country in Africa, together with the amount of unmodified habitat still remaining in each category. We assigned mean rainfall values to each vegetation type in each country.

The regression was used to give a density for leopard in the unmodified portion of each vegetation type and this density was then reduced where necessary by a correction factor for the habitat type. The density in the modified portion of the same habitat was arbitrarily assumed to be one-tenth that of the density in the unmodified part. Further corrections were made for human density in certain areas. Leopard numbers were computed from these densities in each original vegetation type, and summed to give the total number of leopard in all vegetation types in each country. The results are summarised in the column **Predicted Population** in **Table 1**. This is the number of leopard which ought to be present in the areas concerned based on suitable habitat and rainfall.

We have calculated confidence intervals for each country based on the overall mean rainfall and the total leopard population (**Table 2**). It is not valid to sum the upper and lower estimates in Table 2 to obtain the confidence intervals for Africa as a whole. Statistically, the chances of every country being either at the lowest or highest value are negligible.

The confidence limits for the entire population of Africa have been calculated by grouping the individual estimates for each vegetation type into rainfall classes and using the confidence intervals for the population mean in each class. We obtain the result that the final population value of 714,000 in Table 1 should lie between 598,000 and 854,000 leopard. These confidence limits should be taken as a measure of the scatter in the original regression data, rather than definitive upper and lower limits.

The only country for which a serious attempt has been made to estimate leopard numbers is Kenya. Hamilton (1981) concluded that the numbers were probably between 6,000 and 18,000 and estimated the population at 10-12,000. Our estimate for Kenya, based on entirely different techniques, is slightly over 10,000, with 95% confidence intervals indicating that the population lies between 5,500 and 18,300 leopard. Hamilton went further and gave a breakdown of the proportions present in

TABLE 1: LEOPARD POPULATION ESTIMATES

#	COUNTRY	PREDICTED POPULATION	FACTOR	FINAL POPULATION
1	ANGOLA	62,486		62,486
2	BENIN	4,915	0.1	492
3	BOTSWANA	7,729		7,729
4	BURKINA FASO	1,693		1,693
5	BURUNDI	495		495
6	CAMEROUN	41,896		41,896
7	CENTRAL AFRICAN REPUBLIC	41,546		41,546
8	CHAD	3,125		3,125
9	CONGO	32,394		32,394
10	DJIBOUTI	25		25
11	EQUATORIAL GUINEA	5,040		5,040
12	ETHIOPIA	9,782		9,782
13	GABON	38,463		38,463
14	GAMBIA	33		33
15	GHANA	5,990	0.1	599
16	GUINEA	15,689	0.1	1,569
17	GUINEA BISSAU	682	0.5	341
18	IVORY COAST	9,522		9,522
19	KENYA	10,207		10,207
20	LESOTHO	420		420
21	LIBERIA	5,031	0.1	503
22	MALAWI	4,530		4,530
23	MALI	3,365		3,365
24	MAURITANIA	230		230
25	MOZAMBIQUE	37,542		37,542
26	NAMIBIA	7,745		7,745
27	NIGER	454		454
28	NIGERIA	18,963	0.5	9,481
29	RWANDA	388		388
30	SENEGAL	781		781
31	SIERRA LEONE	2,803	0.1	280
32	SOMALIA	2,123		2,123
33	SOUTH AFRICA	23,472		23,472
34	SUDAN	22,035		22,035
35	SWAZILAND	805		805
36	TANZANIA	39,343		39,343
37	TOGO	2,537	0.1	254
38	UGANDA	4,292		4,292
39	ZAIRE	226,192		226,192
40	ZAMBIA	46,369		46,369
41	ZIMBABWE	16,064		16,064
	TOTALS	757,196		714,105

TABLE 2: 95% CONFIDENCE INTERVALS FOR INDIVIDUAL COUNTRIES

#	COUNTRY	RAINFALL mm	LOWER CI %	UPPER CI %	PREDICTED POPULATION	LOWER LIMIT	UPPER LIMIT
1	ANGOLA	1088	45	83	62486	34367	114349
2	BENIN	1153	45	83	4915	2703	8994
3	BOTSWANA	435	45	83	7729	4251	14144
4	BURKINA FASO	879	45	82	1693	931	3081
5	BURUNDI	1196	45	83	495	272	906
6	CAMEROUN	1572	46	84	41896	22624	77089
7	CENTRAL AFRICAN REP.	1436	46	84	41546	22435	76445
8	CHAD	335	46	87	3125	1688	5844
9	CONGO	1643	46	85	32394	17493	59929
10	DJIBOUTI	150	53	103	25	12	51
11	EQUATORIAL GUINEA ..	2582	47	89	5040	2671	9526
12	ETHIOPIA	697	45	82	9782	5380	17803
13	GABON	1871	46	86	38463	20770	71541
14	GAMBIA	1138	45	83	33	18	60
15	GHANA	1326	46	84	5990	3235	11022
16	GUINEA	1911	46	86	15689	8472	29182
17	GUINEA BISSAU	1180	45	83	682	375	1248
18	IVORY COAST	1434	46	84	9522	5142	17520
19	KENYA	528	45	83	10207	5614	18679
20	LESOTHO	786	45	82	420	231	764
21	LIBERIA	2731	49	90	5031	2566	9559
22	MALAWI	1057	45	83	4530	2492	8290
23	MALI	391	46	87	3365	1817	6293
24	MAURITANIA	251	46	87	230	124	430
25	MOZAMBIQUE	968	45	82	37542	20648	68326
26	NAMIBIA	292	46	87	7745	4182	14483
27	NIGER	182	51	103	454	222	922
28	NIGERIA	1300	46	84	18963	10240	34892
29	RWANDA	1103	45	83	388	213	710
30	SENEGAL	855	45	82	781	430	1421
31	SIERRA LEONE	2937	50	92	2803	1402	5382
32	SOMALIA	270	46	87	2123	1146	3970
33	SOUTH AFRICA	477	45	83	23472	12910	42954
34	SUDAN	453	45	83	22035	12119	40324
35	SWAZILAND	796	45	82	805	443	1465
36	TANZANIA	905	45	82	39343	21639	71604
37	TOGO	1228	46	84	2537	1370	4668
38	UGANDA	1109	45	83	4292	2361	7854
39	ZAIRE	1613	46	85	226192	122144	418455
40	ZAMBIA	1018	45	83	46369	25503	84855
41	ZIMBABWE	677	45	82	16064	8835	29236

each of 8 geographical regions of Kenya. Applying our technique to each of these regions, we come out with almost identical results, the greatest difference being 8% in Masailand.

We have examined the predictions for the remaining countries to see if there are any good reasons for certain results to be increased or reduced.

Most of the countries with less than 1,000 leopard (Burundi, Gambia, Guinea Bissau, Lesotho, Rwanda, Swaziland, Djibouti, Mauritania and Niger) are small and densely populated. The last three are desert countries. We can see no reason to alter any of our estimates except perhaps for Guinea Bissau, where we have halved the numbers to be consistent with our treatment of other neighbouring West African countries.

In those countries where numbers lie between 1,000-10,000 leopard, the majority of predictions appear satisfactory (Botswana, Burkina Faso, Chad, Equatorial Guinea, Ethiopia, Malawi, Mali, Namibia, Somalia and Uganda). However, in the group of West African countries (Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Nigeria, Sierra Leone and Togo) our estimates indicate far higher numbers than the authorities in most of the countries would be prepared to concede. Because these countries lie mainly in the lowland rainforest region, very high leopard numbers are predicted from the density/rainfall regression. Clearly an anomaly exists.

Côte d'Ivoire is the one country in the group where there are home range data for leopard and this points to high density populations. Combined with evidence of the distribution of leopard in the country, the estimate is not unreasonable. What is unreasonable is that its neighbours should have negligible numbers.

The low densities reported from the remaining countries in the group are based entirely on subjective impressions. We found no evidence of severe hunting of leopard to account for low populations, or any past epidemic disease which might have decimated numbers. Myers (1976, p49-51) suggests that the extensive "bushmeat" trade in West Africa might be a contributory factor towards the leopard's reduced status. At worst we would expect that this leads to increased home range sizes for leopard.

Eaton (1978) gave "conservative estimates" for Côte d'Ivoire, Ghana and Liberia of 11,250, 5,950 and 5,000 respectively; ours are 9,522, 5,990 and 5,031. His "realistic estimates" for Sierra Leone and Guinea were 3,000 and 10,000; ours are 2,803 and 15,689. He gives no estimates for Togo and Benin.

In most of these countries leopard are reported to be widespread but very scarce. This is incompatible with the situation predicted from our complete compensation model - if leopard are present in an area then they should be close to the saturation density - unless the hunting pressure on the species is so great that it is being held permanently close to extinction in all areas at once, for which hypothesis we found very little evidence. It would be more plausible if the leopard range had been fragmented in these countries and the species wiped out in some of the resulting small islands. But this is not what is being reported. In Benin, Sierra Leone and Liberia leopard apparently occur widely.

As a compromise, we have arbitrarily reduced our estimates in these countries to a tenth of their predicted value, except for Nigeria for which the estimate is halved. However, we are far from convinced that leopard numbers are as low as claimed. Whenever a detailed study of leopard has been carried out somewhere in Africa, invariably more animals are found to be present than were expected at the outset.

The countries with between 10,000 and 100,000 leopard can mostly be grouped into those with extensive areas of tropical rainforest (Cameroon, CAR, Congo, Gabon and Nigeria) and those lying in the extensive miombo woodland belt across southern Africa (Angola, Zambia, United Republic of Tanzania, Mozambique and Zimbabwe). All have good leopard populations and we see no reason to adjust our estimates. The same applies to Kenya and Sudan.

The only controversial estimate in this group is that for South Africa, which is much higher than the 1,500-4,000 predicted by Norton (1984). We have re-examined our analysis and decided to leave the estimate unaltered.

The only country with more than 100,000 leopard is Zaire which has over one million square kilometres of pristine rainforest. It accounts for about one third of the leopard in Africa.

Our final estimates after correction for certain West African countries show a leopard population in sub-Saharan Africa of approximately 714,000 animals, with confidence limits of 598,000-854,000. Although this is the result of an indirect estimating procedure which should be checked by critical field research in as many areas as possible, we feel that, if anything, the analysis errs on the conservative side.

2. PAST AND CURRENT EXPLOITATION OF LEOPARD

2.1. IMPACT OF THE FUR TRADE

We have estimated the number of leopard which might have been killed for the fur trade annually from 1950-1986 in Africa as a whole, and in 5 sub-regions of Africa. The leopard population model was used to simulate the effects which these harvests may have had on the numbers of leopard.

If the number of leopard dying in Africa were as high as 61,000 animals in 1969, the harvest would have had a negligible effect on the total population. The same is true for the populations in the Southern and Central regions. In the Western region, if the population were as low as 75,000 animals (the lower confidence limit), the population would have undergone a significant dip during the peak years of the fur trade, but would have survived it. As it is, using the final estimates for all Western countries combined from Table 1 (116,164), the effect of a harvest of 10,000 animals per year is not significant.

The bulk of the fur trade was not spread evenly over Africa. The effects of the simulation on the Eastern and Northern regions of Africa are very different. In both cases, had the populations been as low as we predict in Table 1, and the peak harvest as high as 15,000 in both regions, the leopard would have gone extinct in 1969 in the North and in 1971 in the East. This would have happened before any of the protective measures which were introduced in the mid-1970s could have made any difference.

The leopard did not go extinct in either of these regions. This leaves two main alternatives: either we have underestimated the populations or we have overestimated the harvest. A third possibility is that our model does not compensate sufficiently for large harvests: however, we have examined this and no amount of compensation could retrieve the situation.

We have examined how large the population would have needed to be to withstand the harvest. In the case of East Africa, if the population were as high as 92,000 animals (which is approximately the upper confidence interval predicted from our analysis), the harvest is accommodated comfortably. At the peak of the fur trade the density is reduced to about 2/3 of its saturation value and the population recovers by about 1980.

In North Africa, it requires a starting population of 100,000 to survive the sequence of harvests. The upper confidence interval for our estimate is about 58,000 animals. A first reaction to this outcome might be that we should increase our estimates for the populations in these areas. This is not necessarily so.

To a large extent the population estimates are based on the amount of unmodified habitat still available for leopard. Current rates for loss of natural habitat in Africa are 2-3% (FAO, 1986). If natural woodland has been disappearing at a rate of 2% for the past 36 years then the present amount is about half that in 1950, and leopard populations would have been double the current estimate.

This more than accounts for the situation in East Africa (twice the current estimate of 54,000 animals would have handled the harvest quite easily), and it accounts for the situation in North Africa. However, it is important to understand that in neither region could the leopard population return to these 1950 levels. The rate of habitat degradation is such that the leopard population would have been forced from a level of 100,000 animals in North Africa in 1950 to a new level of 50,000 animals now - even if there had been no fur trade.

We are, in fact, far from satisfied with the very high estimates for the number of skins entering the fur trade. It seems that too many multiplying factors have been used. At the peak of the fur trade in 1968 the United States imported 9,556 leopard skins (Paradiso, 1972). Myers (1976) largely on the strength of this figure estimated 5 times as many leopard dying in Africa in the same year with few supporting statistics.

An important point comes out of this modelling. A certain size of harvest implies a certain size of population from which it must come. Persons with a particular viewpoint to make have a tendency to understate the number of leopard in Africa and overstate the harvest from them. We are fairly satisfied that, if these high harvests did take place, then by and large the order of size for the population needed to sustain them has not been overestimated in this report.

2.2. CURRENT LEVELS OF EXPLOITATION

The number of leopard skins entering the international trade is a very incomplete index of the number of leopard being killed in Africa. Apart from natural causes, there are three ways in which a leopard may die - through sport hunting, control hunting (a euphemism for the destruction of any leopard which threaten man and his livestock) and hunting for the trade. In all three cases the leopard may die legally or illegally.

It must be accepted that the illegal trade is virtually impossible to assess. The only indices are occasional shipments of skins which may be apprehended by customs and the level of poaching activity which may be detected by wildlife agencies. Because leopard are plentiful outside protected areas, there is little need for the poacher to risk arrest by hunting inside national parks. It is easier to find them outside where the level of anti-poaching activity throughout Africa is negligible. The most reliable data come from the traders themselves, but not all traders are willing to volunteer this information.

Wastage, too, is an unknown quantity. This arises from carcasses not found in the field, from skins allowed to slip, from poor tanning, through destruction of illegal stocks, through losses in shipping and so on.

The number of leopard killed by sport hunting is easy to measure, and in every country we visited these statistics were readily available both for international and local sport hunting. It is far easier to obtain this information from government wildlife agencies than to piece together from international trade statistics or CITES Parties' annual reports.

Of the current sources of leopard skins, control hunting provides about one half. Generally, the number is impossible to estimate directly because of policies adopted by the countries themselves towards control hunting. Wherever it is illegal for citizens to handle problem leopard themselves, invariably there is no information on the number of leopard killed to protect livestock. In most of these countries the provision exists for people to call on staff of the wildlife agency to kill a problem leopard; however, the very small number of cases reported is ample proof that the citizens of the country are managing without them. Thus, control by government may be monitored, but at best it is an incomplete record.

Very few leopard are killed legally for the trade. Those killed in the United Republic of Tanzania appear in the records of TAWICO. In Zimbabwe there is no real separation between leopard killed on control and leopard killed for the trade, and the only source of information is from dealers' records.

In very few cases can the number of leopard dying annually in any country be accurately stated. Statistics on the international trade are not useful now that the fur trade has collapsed and is totally illegal. Furthermore, the system has become extremely complex as a result of all the conflicting procedures which can apply. We have found it impossible to reconcile the CITES data with those we found in individual countries. The best sources of information should be in the producer countries, but the availability of such information is very much dependent on the policy of the country concerned.

We have attempted some crude estimates of the current levels of exploitation for all countries in Africa (Table 3), based on official data (where it was available), reports from illegal traders, and some intuition. We have tended to round numbers upwards so that the table can be regarded as a "maximum likely" situation. In the case of the sport hunting records we have not used the exact numbers of leopard killed in 1986 but have rounded upwards to give a maximum number that are likely to be taken in the given country in current years.

TABLE 3: ESTIMATES FOR THE NUMBER OF LEOPARD CURRENTLY KILLED ANNUALLY

COUNTRY	FINAL POP.	SPORT LEG.	SPORT ILL.	CONTROL LEG.	CONTROL ILL.	TRADE LEG.	TRADE ILL.	TOTAL LEG.	TOTAL ILL.	GRAND TOTAL	POT. HARV.
ANGOLA .....*	62486	5	5	10	100	0	200	15	305	320	3056
BENIN	492	0	0	0	5	0	5	0	10	10	24
BOTSWANA ...	7729	80	20	100	0	0	25	180	45	225	261
BURKINA FASO*	1693	0	0	5	15	0	20	5	35	40	63
BURUNDI	495	0	0	0	2	0	3	0	5	5	19
CAMEROUN ...	41896	0	0	5	20	0	100	5	120	125	1878
CAR	41546	30	5	5	20	0	100	35	125	160	1874
CHAD .....*	3125	0	5	5	20	0	50	5	75	80	155
CONGO	32394	0	2	5	100	0	150	5	252	257	1476
DJIBOUTI ...*	25	0	0	0	1	1	1	1	2	3	1
EQ. GUINEA .*	5040	0	0	5	10	0	20	5	30	35	235
ETHIOPIA ...	9782	25	5	5	50	50	100	80	155	235	403
GABON	38463	0	10	5	25	0	60	5	95	100	1694
GAMBIA .....*	33	0	0	0	1	0	0	0	1	1	1
GHANA	599	0	0	1	5	0	20	1	25	26	76
GUINEA .....*	1569	0	0	0	10	0	30	0	40	40	76
GUINEA BISSA*	341	0	0	0	3	0	5	0	8	8	17
IVORY COAST	9522	0	5	5	15	0	50	5	70	75	371
KENYA	10207	0	5	30	50	0	150	30	205	235	259
LESOTHO ....*	420	0	1	5	5	0	2	5	8	13	20
LIBERIA ....*	503	0	1	1	5	0	10	1	16	17	20
MALAWI	4530	15	3	2	5	0	10	17	18	35	170
MALI .....*	3365	0	0	5	20	0	30	5	50	55	167
MAURITANIA .*	230	0	0	0	2	0	3	0	5	5	11
MOZAMBIQUE .*	37542	0	5	0	50	0	200	0	255	255	1779
NAMIBIA ....*	7745	50	5	100	20	0	20	150	45	195	332
NIGER .....*	454	0	2	0	5	0	10	0	17	17	21
NIGERIA ....*	9481	0	10	10	30	0	100	10	140	150	398
RWANDA	388	0	0	0	2	0	3	0	5	5	11
SENEGAL ....*	781	0	0	1	5	0	10	1	15	16	23
SIERRA LEONE	280	0	0	0	5	0	5	0	10	10	10
SOMALIA	2123	0	0	0	50	0	50	0	100	100	79
SOUTH AFRICA	23472	50	10	140	60	0	20	190	90	280	1050
SUDAN	22035	0	0	20	100	0	50	20	150	170	853
SWAZILAND ..*	805	0	0	1	3	0	5	1	8	9	40
TANZANIA ...	39343	160	20	50	50	10	100	220	170	390	1827
TOGO	254	0	0	0	2	0	3	0	5	5	10
UGANDA	4292	0	5	0	10	0	100	0	115	115	147
ZAIRE	226192	0	10	100	500	0	500	100	1010	1110	10400
ZAMBIA	46369	125	25	125	0	0	75	250	100	350	2075
ZIMBABWE ...	16064	200	10	140	0	20	20	360	30	390	710
TOTALS .	714105	740	169	886	1381	81	2415	1707	3965	5672	32092

* - country not visited
LEG. - legal
ILL. - illegal
POT.HARV. - potential safe harvest

In most of the countries the offtake is well below a sustainable harvest. The safe potential harvest in Table 3 has been calculated by deducting from the total population estimate all leopard populations in National Parks and protected areas where hunting is not permitted, and then calculating a 5% harvest on the remainder of the leopard population.

Somalia is the only country which exceeds the recommended harvest (although the given figure would not exceed the maximum sustained yield). In Mogadishu we found leopard skins available in the Lido market, and one trader could deliver 40 skins within 24 hours. His annual turnover was 70 skins in 1986, of which about half went each year to an Italian client who has been purchasing 25-30 skins for several years. This client's order for 1987 is 35 skins. The annual offtake in Somalia is most unlikely to be less than 100 skins.

It is not possible to deal with all the individual countries in this short report. However, we will discuss briefly the estimates for Botswana, South Africa, Zambia and Zimbabwe to illustrate the effects of policy on the figures in certain columns. In most West African countries it is generally illegal to kill for sport, control, or the trade and this ensures that 99% of killings and transactions are illegal.

Botswana is the only country with a simple, reliable system for monitoring the number of leopard killed. In this country any citizen may kill a leopard to protect his livestock and obtain an ownership certificate for the skin, provided he justifies the killing to a local authority. The skins may then be sold to a limited number of dealers of which Botswana Game Industries purchases more than 90%. The company has set up collecting depots throughout Botswana for all wildlife products and has sent training staff into all districts to instruct people in the best method of skin preparation. All skins purchased are moved to a central processing point in Francistown where detailed records are kept for all species. In this way almost the entire trade can be monitored at the input to the industry. Whilst it might be thought that the Botswana system automatically leads to some leopard being killed primarily for the trade this is seldom the case. Any individual who persistently attempts to get ownership certificates for more than one or two skins draws attention to his activities and is investigated.

About 80 leopard are taken annually in sport hunting and most of the trophies are exported. Some illegal sport hunting takes place and, because government staff are unable to accompany all legal hunts, there is bound to be some "double shooting". A maximum of about 100 leopard are killed for livestock protection. We have allowed for a low level of illegal hunting for trade which does not necessarily occur. A total of 225 leopard may be killed in the country annually, most of which are legal. This is a workable system where very little illegal traffic occurs, and the conservation situation can be readily monitored.

South Africa: Problem leopard may be shot by the landholder, provided he reports the incident, and he may keep the skin. This involves the farmer in a minimum of red tape, and provides a partial record of animals killed on control. However, experience in Zimbabwe, where the same system was applied for many years, showed that only the more conscientious citizens bothered to notify the authorities and a significant number of skins entered the illegal trade.

Sport hunting accounts for about 40 leopard annually, 25 of which result in exported trophies and 10 in local trophies. Perhaps 140 leopard are killed legally and another 60 illegally on control hunting. We have assumed some illegal sport hunting (10). There is no legal export of any leopard skins obtained from control and a leopard may not be killed for trade. As a result of this, a low level of illegal trade may occur (20). It is unlikely that more than 270 leopard are killed annually, two-thirds of which are probably legal.

Zambia: It is legal for citizens to kill a problem leopard themselves, but they are required to report the incident immediately and surrender the skin to government. As long as there is a trickle of skins to government, wildlife staff believe the process is working. This is an illusion. Because the vast majority of citizens cannot be bothered to report the incident and/or hand over the leopard skin, most leopard are despatched with the minimum of fuss and the skins are either destroyed or traded illegally with very few being intercepted by government. We received reports of up to 200 skins for sale in Lusaka.

Zimbabwe: In contrast to Zambia and South Africa, there are very few illegal transactions possible by definition. Problem leopard may be killed by any landholder without government permission and the skins may be legally traded. This provides no direct record of the number of leopard killed annually and fails to separate leopard killed as problem animals from those killed for the trade. To some extent it is possible to measure the combined number of leopard killed by local dealers' purchases. The only criticism we have of the system is that the main emphasis goes into monitoring only the exported component for which CITES tags are required.

Those countries with quotas for the export of leopard skins performed as follows: **Botswana** has used its entire quota of 80 which is totally inadequate for its requirements; **Kenya** has apparently exported only 5 skins against its quota of 80 and these went to Swaziland as a coronation gift. There are at present 21 skins held on wildlife stations and 147 skins in the headquarters store which they may wish to export soon; **Malawi** exported only 5 skins in 1986 but expects to require its full quota of 20 when safari hunting commences this year. We have no data for exports from **Mozambique**. The United Republic of **Tanzania** exported 114 leopard hunting trophies in 1986 and some additional skins obtained from confiscations and control. The total is less than 180 skins which is well under their quota of 250. **Zambia** did not have the figures available for 1986 exports at the time we visited them but based on the previous years exports they are unlikely to exceed 150 (quota 300). **Zimbabwe** has used only 170 of the tags issued for 1986 exports (350). Except for four tourist souvenir skins, all tags went on sport hunting trophies. The figure is low because the authorities have been holding back on the issue of tags until they can develop a rational system for allocation to the private sector. Several game ranchers are holding stocks of leopard skins which they are waiting to export.

The total number of leopard deaths estimated in Table 3 is about 6,000 per year, made up of 2,000 legal and 4,000 illegal. Sport hunting accounts for about 1,000 animals (legal and illegal), control 2,500 and trade 2,500.

The value of the harvest is about US$ 6 million, assuming that leopard are worth US$ 5,000 in sport hunting and US$ 500 in the trade. The full value would not have been realised by Africa because most of the animals killed on control hunting would have been wasted. The returns from the illegal trade would also have gone to a very small number of people and not government or law-abiding citizens. Properly managed, the returns to countries could be a great deal higher.

3. MANAGEMENT OF LEOPARD

From our leopard population model it is possible to give a **technical basis for management,** in the form of sustainable offtakes under various treatments of leopard populations. But this is only part of a subject involving aesthetic decisions, policies, institutions and research. These issues are more important than the technical matters. People have been managing leopard for years in Africa without the benefit of our population model and they will continue to do so.

The available range for leopard will decrease by half again in the next 20 years and leopard populations will also halve. This can be fought every inch of the way, and conservationists can continue to publish articles on the decline. It will not do much good. How do you manage a species which nobody wants living in their gardens? It occurs mainly **outside** national parks and would not be tolerated in the northern hemisphere.

Many African governments would like to manage leopard in the best way possible. Too often they are constrained by conservation policies they have inherited which are no longer appropriate. Few have adequate budgets to protect wildlife in national parks, never mind leopard in unprotected areas. They are up against very powerful laws and traditions in farming areas which give almost unlimited rights to farmers to protect their interests against dangerous vermin. Lacking most of all is any original thought on the subject. Leopard are being allowed to disappear by default.

3.1. POLICY

If the government of a country finds the idea of leopard exploitation distasteful they are at liberty to give the animal ultimate protection. But they should at least be aware of the implications, practicality and costs of their chosen path. They may gain praise from some quarters by declaring the leopard a highly protected species but it will not solve a number of problems at home.

Few agencies would wish to exploit leopard in their national parks, but they may look for workable solutions to the leopard problems in their farming areas. In the previous section (2.2) we compared some policies which work and some which do not. In many countries, it is believed that unless problem leopard are dealt with by staff of the wildlife department the result will be uncontrolled exploitation. It is necessary to remove temptation from rural peasants. There are two inherent flaws in this system. The first is that the response by government staff is usually too slow to solve the problem. The second is that there is absolutely no good reason why the government should get the benefit of the value of the skin.

In some countries private citizens are allowed to kill problem leopard themselves and to become the legal owners of skins, but it is prohibited to trade in the skins or export them. This is a certain way to promote the illegal trade. In some countries the citizens are more law abiding than others, but generally it is a convenient government illusion that people will respect unworkable laws. In Botswana, where rural people are legally allowed to kill leopard to protect their livestock and to sell the skins for gain this has not resulted in the wholesale slaughter of leopard as predicted. In Kenya where the law prohibits the killing of leopard by citizens, the illegal trade in leopard skins is alive and well.

We advocate a pragmatic policy towards leopard in the rural areas of African countries which accepts that leopard will decline anyway as the amount of natural vegetation is reduced, which accepts the reality that private citizens will control leopard illegally if there are no legal channels, and which provides at least a means of monitoring the process and judging the severity of the conservation problem.

3.2 INSTITUTIONS

If a country decides to allow rural farmers to kill leopard themselves and is anxious to ensure that the species does not go extinct and the skins do not enter an illegal market, what should it do?

Of the systems we have encountered, that in Botswana (see above) appears the best. There is very little wastage of potentially valuable products and the records of skin purchases are available to government at all times to monitor the conservation status of any species.

In Zimbabwe, landowners manage their wildlife resources for their own benefit. They may exploit leopard for trade purposes if they wish, but most are sold for sport hunting, and some are killed to protect livestock. The skins are sold to best advantage. This has applied mainly to large commercial farms and the system is not necessarily suitable for countries where most land is communally owned. Communal resources require a very different approach for conservation (Martin, 1986).

One possibility is for governments to buy the skins of leopard from rural farmers at a fair price - high enough to eliminate competition from illegal buyers. This is a mechanism which ensures that both the citizens who deserve compensation for stock losses and the government receive a share of the spoils.

Another option for the use of leopard in unprotected areas is sport hunting. But it should not be thought that sport hunting can replace problem animal control or even reduce it. Sport hunters do not usually hunt at the time of year when leopard attack livestock, and sport hunters do not particularly like to hunt in heavily settled agricultural areas.

The revenue from sport hunting tends go entirely to government, even when the leopard are taken in communal lands. In Zimbabwe, all monies earned from wildlife in communal lands are returned to districts councils - but this does nothing to compensate the individual stockowner who loses animals to leopard. The Defenders of Wildlife (1980) and Myers (1980) are totally correct in their statements that the income earned from sport hunting in Africa does little for rural peasants - generally it does not. The need for institutions to alter this situation is long

overdue. Nevertheless, leopard are far more valuable in sport hunting than trade, and it is a sensible land use in areas which are unprotected and unsettled.

Governments need to think originally about institutional systems which would work in their particular countries, knowing the characteristics of their people, the geography of the country and the present problems.

3.3 SUSTAINABLE OFFTAKES

It may appear somewhat academic to talk about sustainable offtakes from populations which cannot be counted. This problem was expressed by one agency after another in the various countries we visited. The costs of counting leopard are very high and generally cannot be justified. In wildlife management nothing is a certainty, and the standard approach of counting animals and then deciding on a harvest does not work with many species. More and more, wildlife managers have to rely on indirect methods of assessement and adaptive management (Holling, 1978). Population size can be estimated conservatively and a certain harvest applied. From simulation models certain characteristics of both the harvest and the remaining population can be predicted. By monitoring the appropriate parameters over a period of time, the size of population can be quite closely estimated.

In rural farming areas where leopard are likely to be eliminated as a matter of policy, there is little point in talking about sustainable offtakes. The chances of saving leopard in such areas will be far greater if the major conservation effort goes into policy and institution building than in worrying about sustainable offtakes. Only when the farmers themselves realise the value of the leopard is there likely to be an interest in a sustained yield.

We have used our simulation model to examine three different types of harvesting. In **sport hunting** more males than females are killed; both sexes are hunted for the **trade** in the ratio in which they occur in the population and all animals in the population are hunted on **control**. We expect control hunting to simulate the effects of a poison campaign. In all the simulations it is assumed that the cubs belonging to any breeding female who is killed will also die.

The intrinsic growth rates (Rmax) at different saturation densities, and maximum sustainable offtakes for the three forms of harvest (Sport hunting - Hmax, Trade - Tmax, Control - Cmax) are given below.

MAXIMUM SUSTAINABLE HARVESTS

Density	.001	.002	.005	.01	.02	.05	.1	.2	.5	1 / sq.km.
Rmax	3.3	4.7	6.4	7.8	9.2	10.9	12.2	13.7	15.5	17.0 %
Hmax	6.3	7.7	9.4	10.9	12.0	13.8	15.0	16.3	18.0	19.1 %
Tmax	3.4	4.7	6.4	7.8	9.2	10.9	12.2	13.7	15.5	17.0 %
Cmax	3.0	4.4	6.0	7.2	8.5	10.0	11.3	12.6	14.2	15.8 %

At any given density the highest harvest is obtained from sport hunting. This is because the selection for males has a minimum effect on breeding success. The trade hunting offtakes match the intrinsic growth rates of the population exactly and the control hunting offtakes are substantially lower than either those for trade or sport hunting.

All of the above harvests cause no decrease in the density of leopard populations according to our complete compensation model. Only if they are exceeded does the population crash. However, the maximum sustainable offtake should not be suddenly applied to a previously unhunted population because it takes three years for the effects of increased survival of young animals to result in a larger breeding sector in the population. Harvests should start below the maximum (75%) and be increased gradually.

Although densities do not alter with increased offtakes, there are significant changes in the population age structure, particularly under sport hunting where there is a selection for adult males. Under good management it would be unwise to exceed a "safe" potential harvest of about 5% which ensures a high quality of older trophy animals. This level of harvest is fairly safe under all forms of hunting except at the very lowest densities where it should be reduced further.

3.4 ECONOMIC RETURNS

The highest value which could be placed on certain individual leopard results from tourism. However, only a minute fraction of Africa's leopard falls into this category.

In sport hunting the value for leopard can be put at US$ 5,000-10,000. The higher values come from countries such as Botswana and Zambia where elephant cannot be hunted and leopard are one of the main drawcards. The value is not simply the trophy fee payable to governments (usually about US$ 1,000), but rather the gross value to the hunting days it generates and the foreign exchange earned.

By far the bulk of Africa's leopard are never going to achieve these values because they are not located in areas where tourism and sport hunting will ever be major industries - particularly those which are living cheek by jowl with rural farmers in heavily settled areas. Governments have the option of making them valueless or realising the current trade prices for well tanned leopard skins which vary from US$ 500-1,000.

The returns which might be possible from exploiting leopard in sub-Saharan Africa have been calculated using the "safe" potential harvests given in Table 3 which are based on an offtake of 5% of the leopard outside protected areas. The analysis in Table 4 excludes all countries with less than 1,000 leopard, and assumes that the sport hunting market cannot be increased by more than a further 3,000 leopard, which are allocated to countries in proportion to the size of the potential harvest.

The balance of the potential harvest has been allocated to trade in leopard skins. Where we have doubts that this offtake could be evenly distributed throughout a country, we have halved the offtake (e.g. Cameroon, CAR, Congo, Côte d'Ivoire, Gabon, Guinea, Mozambique, Nigeria, South Africa, Sudan, United Republic of Tanzania, Zambia) and in Zaire we have reduced it to a quarter.

We have assumed an institutional arrangement whereby governments buy skins from rural farmers who have shot them on control (and perhaps a few deliberately for the trade) at a value of US$ 250, and resell them for a profit of US$ 500.

TABLE 4: ESTIMATED POTENTIAL RETURNS FROM LEOPARD EXPLOITATION

#	COUNTRY	FINAL POPULATION Nos	POTENTIAL HARVEST Nos	SPORT HUNTING Nos	TRADE HUNTING Nos	SPORT HUNTING US$	LOCAL PAYMENTS US$	GOVERNMENT SALES US$	TOTAL RETURNS US$
1	ANGOLA	62,486	3,056	293	2,763	1,465,000	690,750	1,381,500	3,537,250
2	BENIN	492	24						
3	BOTSWANA ...	7,729	261	105	156	525,000	39,000	78,000	642,000
4	BURKINA FASO	1,693	63	6	57	30,000	14,250	28,500	72,750
5	BURUNDI	495	19						
6	CAMEROUN ...	41,896	1,878	177	851	885,000	212,750	425,500	1,523,250
7	CAR	41,546	1,874	207	834	1,035,000	208,500	417,000	1,660,500
8	CHAD	3,125	155	15	140	75,000	35,000	70,000	180,000
9	CONGO	32,394	1,476	139	669	695,000	167,250	334,500	1,196,750
10	DJIBOUTI ...	25	1						
11	EQ. GUINEA .	5,040	235	22	107	110,000	26,750	53,500	190,250
12	ETHIOPIA ...	9,782	403	63	340	315,000	85,000	170,000	570,000
13	GABON	38,463	1,694	160	767	800,000	191,750	383,500	1,375,250
14	GAMBIA	33	1						
15	GHANA	599	76						
16	GUINEA	1,569	76	7	35	35,000	8,750	17,500	61,250
17	GUINEA BISSA	341	17						
18	IVORY COAST	9,522	371	35	168	175,000	42,000	84,000	301,000
19	KENYA	10,207	259	24	235	120,000	58,750	117,500	296,250
20	LESOTHO	420	20						
21	LIBERIA	503	20						
22	MALAWI	4,530	170	31	139	155,000	34,750	69,500	259,250
23	MALI	3,365	167	16	151	80,000	37,750	75,500	193,250
24	MAURITANIA .	230	11						
25	MOZAMBIQUE .	37,542	1,779	168	806	840,000	201,500	403,000	1,444,500
26	NAMIBIA	7,745	332	81	251	405,000	62,750	125,500	593,250
27	NIGER	454	21						
28	NIGERIA	9,481	398	38	180	190,000	45,000	90,000	325,000
29	RWANDA	388	11						
30	SENEGAL	781	23						
31	SIERRA LEONE	280	10						
32	SOMALIA	2,123	79	7	72	35,000	18,000	36,000	89,000
33	SOUTH AFRICA	23,472	1,050	149	451	745,000	112,750	225,500	1,083,250
34	SUDAN	22,035	853	81	386	405,000	96,500	193,000	694,500
35	SWAZILAND ..	805	40						
36	TANZANIA ...	39,343	1,827	332	748	1,660,000	187,000	374,000	2,221,000
37	TOGO	254	10						
38	UGANDA	4,292	147	14	133	70,000	33,250	66,500	169,750
39	ZAIRE	226,192	10,400	982	2,355	4,910,000	588,750	1,177,500	6,676,250
40	ZAMBIA	46,369	2,075	321	877	1,605,000	219,250	438,500	2,262,750
41	ZIMBABWE ...	16,064	710	267	443	1,335,000	110,750	221,500	1,667,250
	TOTALS .	714,105	32,092	3,740	14,114	18,700,000	3,528,500	7,057,000	29,285,500

The total potential return is some US$ 29 million made up of US$ 19 million from sport hunting, and US$ 10 million from the trade. The figures must be regarded as opportunity costs which are lost to African countries if they adopt certain conservation policies as opposed to others. Western countries which are anxious that Africa protect all leopard at all costs should be prepared to pay these opportunity costs.

3.5 RESEARCH

The sort of research that is needed to supplement the management of leopard is not the current type of in-depth biological study being carried out on large carnivores in several places in Africa. It is also not cost-effective or necessary to attempt to count leopard. What is required is applied research related to active adaptive management.

Monitoring should involve recording the sex and physical measurements of animals killed, amongst which should be the length and width of the skull which are the only reliable measure of trophy size. The most useful parameter is the age of the animal (obtained from the dentition) which permits deductions about the age pyramid of the population. From the data, the selectivity of hunters for particular sizes of animals can also be derived, and the results used to improve a harvesting simulation model.

Hunter effort is an index of the abundance of leopard and both success and number of days spent seeking leopard should be recorded. If hunter effort rises from one year to the next it may be an indication of reduced numbers. Sightings of leopard on hunters' baits is another useful record of abundance in an area and can provide density estimates.

Apart from management-related research, there is a specific need to examine leopard densities in rainforest, particularly in West Africa. The leopard populations predicted by our analysis are far higher than anyone in these countries would be prepared to concede, yet at the same time we have found no conclusive evidence that the populations are at some other level.

The leopard population model developed for this survey needs testing against real populations. The complete compensation aspect of the model can be confirmed by subjecting a closely monitored population of leopard to two or more different levels of harvesting. If densities remain the same the principle can be accepted as proved. There is a further need to verify the thresholds at which sustainable harvests are no longer possible.

The primary research need is to make an hypothesis about the outcome of a particular harvesting offtake, apply the treatment, measure the response and revise the initial hypothesis before applying the next treatment. Alternatively, the next treatment should be applied in such a way that it will answer the questions that previous treatment did not.

4. RECOMMENDATIONS TO CITES

4.1 WHICH APPENDIX?

Article II, paragraph 1 of the Convention on International Trade in Endangered Species of Wild Fauna and Flora states:

"Appendix I shall include all species threatened with extinction which are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances."

The key issue here is whether the species is **currently threatened with extinction.** If its status is presently satisfactory but it is possible that trade might jeopardise this, then it belongs in Appendix II.

Appendix II includes two categories of species: those which are not necessarily threatened with extinction now, but which might become so if the trade is not regulated, and those which are not threatened at all but nevertheless should be included because of their similarity to certain other species which could be threatened by trade.

Our estimate for the number of leopard in Africa is in excess of 700,000. When it is considered that the animal is a carnivorous predator at the top of the food chain, this number is very high indeed. **The species is not threatened with extinction.**

This is a **necessary and sufficient condition** for the species to be moved off Appendix I, and the discussion could end here. However, since it undoubtedly will not at the CITES meeting of the Parties, we will consider a number of secondary arguments on the subject.

It can be argued that the African leopard is only one of a group of spotted cats, and that many other species may not enjoy as healthy a conservation status. If trade is affecting the snow leopard, the clouded leopard and the jaguar on other continents is this not a good reason to keep the African leopard in Appendix I? No. The Convention provides for Appendix II status of common animals such as the African leopard which fall into the "look-alike" category. The principle of "positive listing" may be advanced as an argument for Appendix I status. It is easier to treat all incoming spotted cat skins as Appendix I species in which trade is prohibited until the documents prove otherwise. This simplifies matters for customs officers with which principle we fully agree. However, the same ruling applies: Appendix II status ought to be adequate.

Certain leopard populations in West Africa are reported as being endangered, although we are not convinced that this is the case. The Convention provides for Parties to unilaterally prohibit exploitation and/or trade in an Appendix II species and, indeed, this mechanism is already used by many countries.

Appendix I status for the leopard disadvantages legitimate wildlife traders with bureaucratic controls which do not affect illegal traders or other livestock industries against which wildlife is competing. The wildlife industry relies on relatively light exploitation of a large number of species for its success and is weakened if any species is not available for exploitation, particularly for artificial reasons.

In section 3 it was argued that a realistic estimate of the opportunity costs for not exploiting leopard legitimately and rationally in Africa are of the order of US$ 30 million per annum. These costs are being borne by Africa, not by the conservation lobby who wish to see the leopard in Appendix I. Even the CITES Management and Scientific Authorities from Africa who vote on the issue at the meeting of the

Parties are not necessarily the disadvantaged parties, for they are not the prime economic risk-takers. The end effects will be felt by legitimate wildlife ranchers and rural peasants. The advantage is all to the illegal trader.

The question of whether the fur trade could ever again reach the levels of 1967-1973 is one which bothers CITES Party states. Before considering whether the threat still exists, perhaps we should examine just how bad the threat was. From our simulations of the trade since 1950 we conclude that only North Africa and East Africa could have suffered as a result of this harvest. Had it been possible to sustain the level of harvest in these regions for any length of time there certainly could have been local extinctions. However, it is inescapable that either the offtake was not as high as people would represent it, or the populations of leopard were very much higher than thought in the first place. The irrefutable proof of this is that leopard are not extinct, even locally, in these regions. Most African countries were relatively untouched by the exploitation at the height of the fur trade and those that were have recovered.

Past history does not determine Appendix I status. To be included in Appendix I, a species requires to be currently threatened with extinction. If the trade could threaten it in the future it should be in Appendix II.

We are not sure whether a vast leopard skin trade could ever re-emerge. Perhaps there is a much more important question to be asked here. Does CITES work or does it not? In the case of the leopard skin trade it is difficult to answer that question, because CITES had little to do with the collapse of the fur trade. A far more powerful force, **public opinion,** was responsible. The fur trade was virtually over before the first meeting of the Parties to CITES in Berne in 1976.

Those who fear the emergence of a second boom in leopard skins are more or less stating that they doubt the ability of the Convention to contain it unless the species retains its Appendix I status. But things have changed. We now have the controls which were lacking 15 years ago, and we have gone through the moratorium period recommended by Myers (1976). If CITES works then the controls on trade in Appendix II species should work as well as the controls on Appendix I species. From the tone of the arguments it is apparent that a lot of people do not believe that they do. Why?

The difference lies in the provisions of Article III and Article IV of the Convention. Trade in specimens of Appendix I species requires the blessing of the Scientific and Management Authorities in the importing country, notwithstanding any blessing given by the exporting country. For species in Appendix II, only the Scientific and Management Authorities of the exporting country are involved. Demanding Appendix I status for the leopard is equivalent to indicating a lack of trust in the Scientific and Management Authorities in Africa. The main underlying motive of the group of African countries which sought and obtained quotas was to lift the yoke of the Scientific and Management Authorities outside Africa. The same principle applies now to the question of Appendix II status for leopard.

Many people have criticised the official bodies responsible for wildlife management in Africa and much of the criticism is justified. But we would hasten to disabuse anyone of the notion that the problem can be

rectified by withholding the right to trade under the Convention. CITES is founded on the mutual trust and diplomatic recognition of all accredited representatives, without which there is no basis for agreement. We share the frustration of those who are desperately anxious to see an end to the abuse of wildlife, but we do not believe that anything constructive will be achieved by playing politics with the CITES appendices. If the Convention is to work, then decisions must be based on the best technical information.

Some people regard each new species added to Appendix I as a conservation victory. Others see additions to Appendix I as evidence of yet one more conservation failure. It is very much easier to get species included in Appendix I then it is to get them removed. When leopard were included at the Washington Conference in 1973 many African countries were not represented.

The Convention has become unwieldy with the large number of animals that have been included in Appendix I. If customs officers are to implement the Convention effectively then the list should be as short as possible and Appendix I should be reserved for animals that really are on the brink of extinction - and likely to be pushed over the brink by trade. To compare the status of the black rhino, for example, with that of the leopard highlights the rather ludicrous situation to which Appendix I has been reduced. The rhino really is threatened (and Appendix I listing has not arrested the decline) while the leopard is a common animal.

We have heard the view expressed that it is most unwise to tamper with the list of species in Appendix I because this will only cause confusion in the minds of the public. We cannot regard this as a valid excuse for a wrong decision. The public are not idiots and will judge any well-reasoned case on its merits. It is dishonest to cry "Crisis!" when none exists.

The technical basis for removing the species from Appendix I can be argued indefinitely without any resolution between Parties with entrenched viewpoints. The argument would be greatly reduced if it were recognized that there is a point where technical matters cease and aesthetic decisions take over (Bell, 1983). There is nothing to be ashamed of in stating that the idea of exploitation of leopard is repugnant. This argument carries far more weight with us than any of the so-called technical reasons why the leopard should be in Appendix I. However, the decision-maker using this as his final argument should be well aware of the implications, practicalities and costs of his decision. As far as possible, the CITES forum is meant to be totally objective over matters of trade and extinction.

Many countries have expressed the view to us that to leave the leopard in Appendix I with quotas is not a major hardship. It will not prevent them from exporting hunters' trophies or the occasional skin and it keeps CITES Parties happy. However, they feel strongly that quotas should be set by themselves and advised to the CITES Secretariat for notification of all Parties. As consultants, we feel bound to advise that whilst the above approach is pragmatic, it is not the solution to the problem. There is a principle involved which, if ignored, can only harm CITES. If species which are not endangered continue to be listed in Appendix I, the Convention will be weakened and cease to fulfil its original function.

4.2 NECESSARY CONTROLS

This section is written on the assumption that the species moves to Appendix II. At present trade in leopard products is carried on by those countries which have quotas for the purposes of Appendix I. We would point out that quotas are not strictly necessary: provided the Scientific and Management Authorities in both the exporting and importing countries approve the transaction, the export can take place (e.g. South Africa has no quota for leopard but still exports hunting trophies on this basis).

In the normal course of events, there is no need for any species to be subject to the restrictions of a quota if it is in Appendix II. The first quotas for an Appendix II species were introduced at the meeting of the Parties in 1985 to control the trade in ivory. By far the most important reason for quotas is to encourage African countries to reconcile the ivory which leaves their countries with their own stated management policies.

7By the same token there is merit in retaining the concept of quotas for leopard in Appendix II. Provided these quotas are not seen as an imposition by other countries on African producers, there is no reason why quotas should not be encouraged as a positive management approach.

The quota should not be seen as an exact estimate of the number of leopard which will die in the year concerned. Except for sport hunting, this is impossible to predict. Rather it should be the maximum number of leopard which the authorities would regard as being a safe harvest from the population. Above this number there would be concern if more leopard were killed (note that this concern would come from the producer countries themselves, rather than anyone else). There is no obligation to fulfil the number of skins stated in the quota.

We can see no reason for the quotas to be granted by the meeting of the Parties to CITES. As in the case of elephant, these quotas should be advised to the Secretariat and the Parties duly notified. If a country decides to increase its quota at any stage this too should involve no more than a letter to the Secretariat advising them of the new quota.

We favour retaining the present system of locking tags for export of leopard skins. These tags should be issued by the CITES Secretariat in response to any country's request for a quota or for an increase in its quota. It is debatable whether quotas are necessary at all if the tags are recognised throughout the world as the authentic seal of approval of the Scientific and Management Authorities in the exporting country.

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