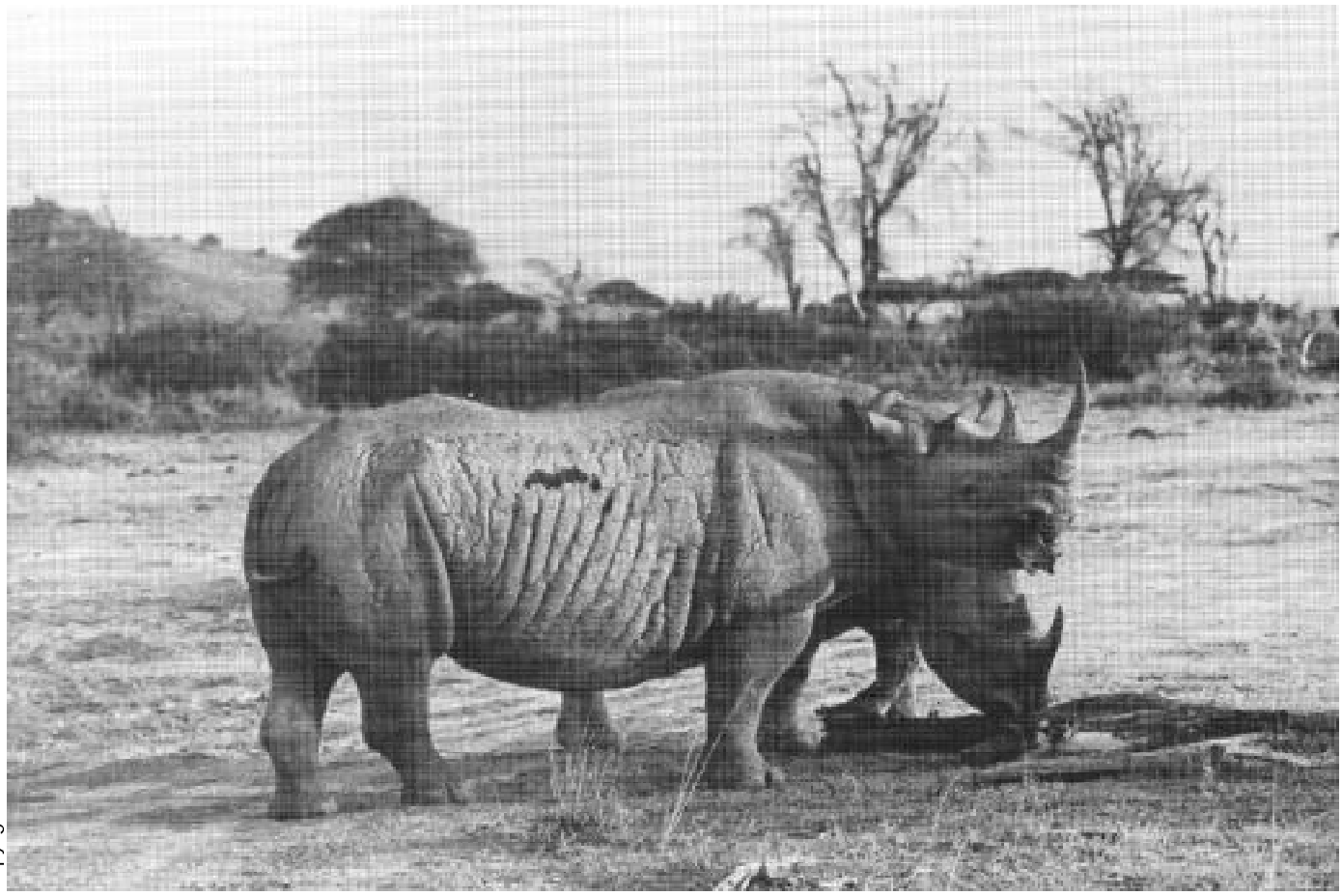


Black rhinos in Amboseli, Kenya with Mount Kilimanjaro's lower peak in the background.

The Undetected Trade in Rhino Horn

David Western

Summary

Calculations from field data suggest that trade statistics account for a half or less of the rhinos poached in Africa since 1970. Recent trade surveys may have improved the level of detection, but large volumes of poached horn go unaccounted. Trade bans have not discernably slowed the loss of rhinos. The market is far more likely to be throttled by redoubled efforts to protect 3,000 of the remaining 3,800 black rhinos in African strongholds than by trade action.

Introduction

Rhinos in Africa and Asia are gravely endangered or severely threatened. While habitat loss and land pressure have contributed to the decline in all five species of rhinos - the Indian, Sumatran and Javan in Asia, and the black and white in Africa - poaching has posed the biggest threat in recent years. The black rhinos has suffered worst.Since 1970 its numbers throughout Africa have declined from 65,000 to around 3,800 in 1987 (Cumming, 1987). The demand for rhino horn,used for traditional medicines in the Far East and dagger handles in the Near East, has provided the direct stimulus for poaching, following a rapid price rise in the early 1970s reaching wholesale in 1979 $ 550 for African horn per kilo and $ 9,000 per kilo for Asian horn. (Martin, 1983).

Trade is virtually the only factor exterminating rhinos now that most are confined to parks and sanctuaries where habitat loss and land conflict are negligible. Where rhinos have been well protected, numbers have increased rapidly, as in the case of southern white rhinos in South Africa (Owen-Smith, 1981), black rhinos in Kenyan sanctuaries (Western, 1987) and Indian Rhinos in Nepal (Martin, 1982). If the trade in horn can be arrested, numbers would undoubtedly rebound quickly. Space within existing parks and reserves in Africa could, in the absence of poaching, support in excess of 50,000 black rhinos (Western, 1987).

Since 1980 sustained efforts have been made to identity the volume and trading networks involved in the rhino horn trade. Legal trade has been successfully closed under CITES regulations and through specific import bans by non-signatory nations, but that does not mean to say that trade has stopped. Field evidence shows the black rhino population has continued to decline steadily since the late 1970s (Cumming, 1987). The failure of trade bans raises the question of whether we have successfully identified the volume of rhino horn traded annually and all the major markets.

An obvious way to look at the efficiency of trade surveys is to compare the volume of rhino horn entering the market, calculated from field data, and the amount picked up in market surveys. At the Cincinnati Rhino Workshop in 1986, I pointed out that prliminary calculations showed about half the annual output of horn was being missed, suggesting a large unidentified market. The following article lays out the assumptions and calculations used in assessing the volume of rhino horn entering world markets since 1970, as called for at the African Elephant and Rhino Specialist Group's 1987 Nyeri meeting. The analysis ignores the relatively modest amount of Asian horn entering the market

The number of rhinos dying

The number of rhinos that have died each year since 1970 can be calculated from two sets of figures. The first and simplest set is derived by deducting the present from starting population size.In the case of the black rhinos, the population has fallen from

65,000 to 3,800, according to the various estimates given by AERSG (Cumming, 1987).Over the same period, the northern white rhino declined from around 2,000 to around 30 (Western, 1987). The overall losses amount to 61,200 black rhinos and some 1,970 northern white rhinos. The southern white rhino has increased over this period (Western and Vigne, 1984), So there was no net loss. The closely protected herds accounting for the increase would have contributed a negligible volume of horn to the world market.

The second set of figures, the additional numbers that were born and subsequently died during that interval (turnover), can be calculated by multiplying the population size for each year by the birth rate, summed for all intervening years. The yearly population size can be inferred from the graph of population decline (Fig. 1). The annual recruitment rate, which varies from 7 per cent to 10.9 per cent (Goddard, 1970) can be calculated from field data. Most figures tend toward the higher recruitment rates. I have taken 7 per cent and 10 per cent to represent a high and low figure. The question is, does heavy poaching lower recruitment rate? The evidence is to the contrary. During a period of heavy poaching in Amboseli, the recruitment rate (Western and Sindiyo, 1972) was similar to that in unpoached populations at Olduvai and Ngorongoro (Goddard, 1970).

The additional deaths due to animals that were born and subsequently died during each year can now be calculated by using the inter-polated population size (Fig. 1), multiplied by the high and low recruitment rates. A similar exercise can be repeated for the northern white rhinos, for which I have assumed a similar range of low and high recruitment rates, consistent with known figures (Owen-Smith, 1981).

The additional deaths due to turnover during the period 1970 to 1987 amount to 33,600 black rhinos, assuming a recruitment rate of 7 per cent, and 48,000, assuming a recruitment rate of 10 per cent. Similar calculations for the northern white rhino give additional deaths of 1,275 and 1,820 at a 7 per cent and 10 per cent recruitment rate respectively. The total number of deaths from direct losses and turnover was 94,800 and 109,200 black rhinos on the low and high recruitment assumptions, and 3,245 and 3,790 northern white rhinos on the same assumption.

The losses attributable to poaching

How many of the animals dying are poached? If poaching accounts for the precipitous drop in rhino population since 1970,

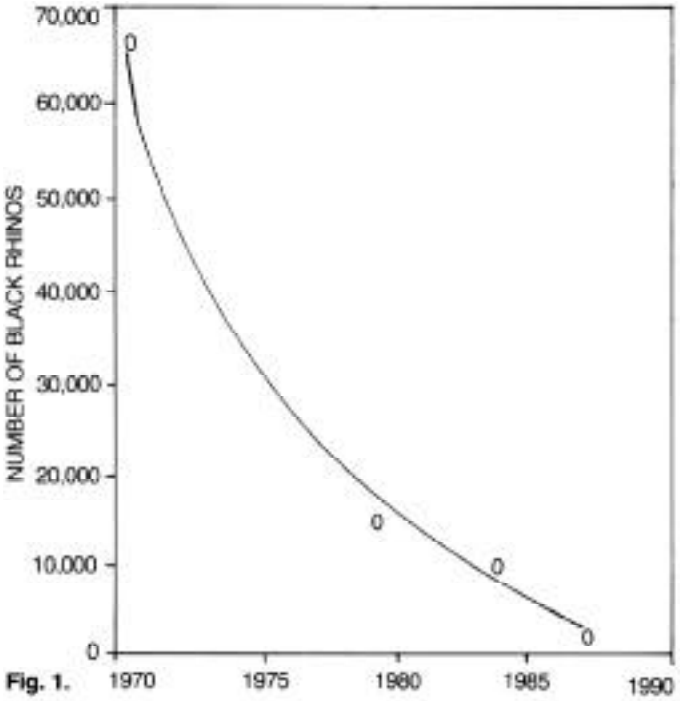


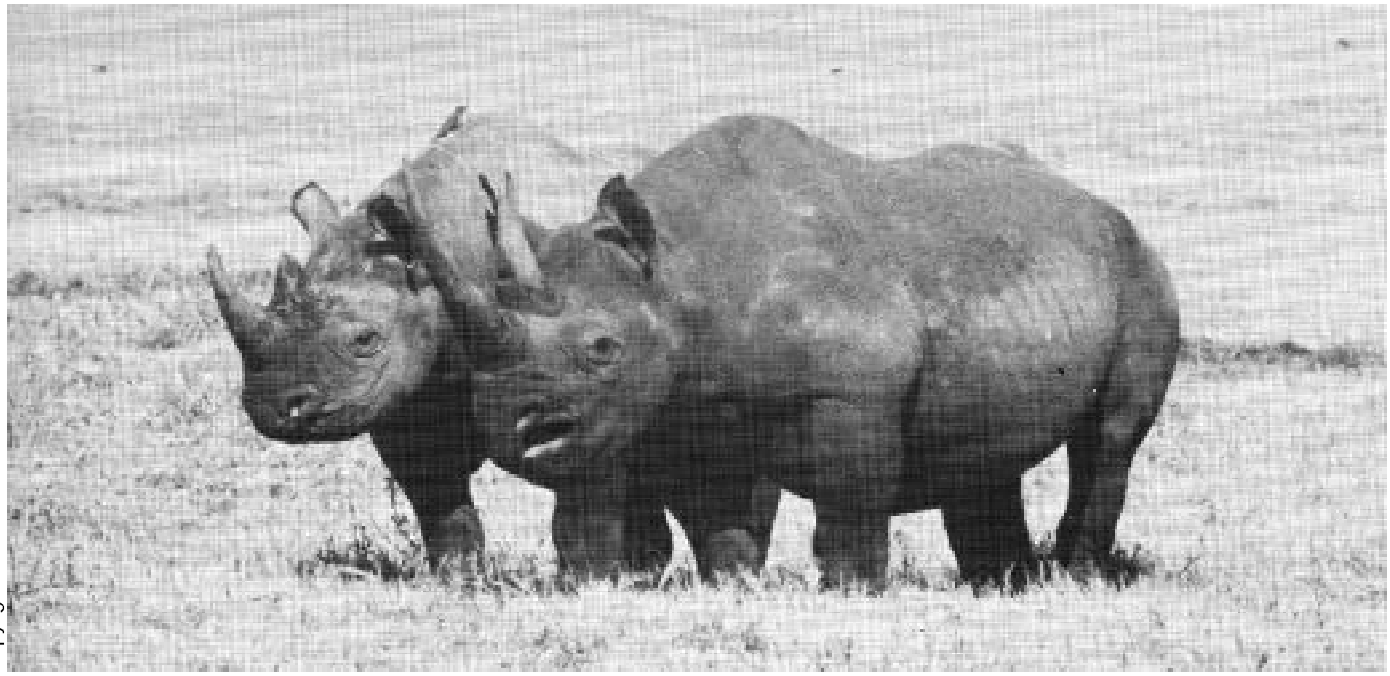
Fig. 1. ESTIMATES OF POPULATION OF BLACK RHINOS IN AFRICA

amounting to a 94 per cent loss of black rhinos and 99 per cent loss of northern white rhino, it is reasonable to assume that most horns entered the trade. This argument would apply both to the absolute loss in numbers and turnover. The available field data supports this contention. In Amboseli, Kenya, Western (1972) reported that, minimally, 94 per cent of all rhino deaths in a population where all individuals were known resulted from poaching. Since the rates of loss in Amboseli are consistent with the continental pattern, we can feel reasonably confident of applying similar poaching rates to the total population. I have, therefore, assumed that 90 per cent of all rhino losses are due to poaching for horns.

Losses due to other causes

A certain portion of females killed will have calves too young to

Black rhinos side by side in Ngorongoro Crater, Tanzania.



survive alone. A large portion of orphaned calves are likely to succumb to predators, starvation or other causes. They will not provide much horn to the world market. I have ignored their contribution altogether. Calves two years or younger are especially vulnerable once orphaned. Others will die from natural causes such as disease and predation (Goddard, 1970) and only contribute modestly to the horn trade. Data from Amboseli (Western and Sindiyo, 1972; Western, 1982) show that 8.8 per cent of the mortality was due to orphaned calves and juvenile mortality during a time when poaching accounted for most adult deaths. The figure may be biased on the low side, due to the difficulty of recording mortality in very young calves (Goddard, 1970). I have therefore assumed that 20 per cent of the annual mortality involves juveniles which make no contribution to the horn trade. At two years of age, calves have horns weighing in the order of a kilogram, an attractive target for poachers. I have lumped animals two years and older with adults.

The number and volume of horn entering the trade

The number of rhinos killed for the trade can now be calculated by deducting the non-poached sources of mortality from the total number of deaths calculated for the period 1970 to 1987. This amounts to 30 per cent of all deaths - 20 per cent due to infant mortality, 10 per cent due to adult deaths from causes other than poaching. The number of black rhinos poached amounts to 66,360 and 76,440 on the high and low projection, and the number of northern white rhinos to 2,272 and 2,653 on the high and low projection.

The volume of rhino horn entering the market can be calculated by multiplying the total numbers killed by poachers, multiplied by the mean weight of horns for black and white rhinos. The mean weight of black rhino horn entering the trade is 2.88 kg and the mean weight of white rhino horn entering the trade is 3.68 kg (Bradley Martin, pers. comm.). The overall volume of horn entering the trade between 1970 and 1987 therefore amounts to 199,478 kg and 229,910 kg for black and northern white rhinos using the high and low recruitment figure respectively.

The missing rhino horn trade

We can now look at how much of the horn entering the market is picked up by trade surveys. Esmond Bradley Martin has calculated from numerous surveys (Martin, 1979; 1983; pers. comm.) that the volume of horn traded in Asia amounted to 8,000 kg annually in the 1970s and 3,000 kg annually during the 1980s. These figures are necessarily coarse, but do give some idea of the relative volume detected. Overall, the volume of horn recorded in the Asian market amounts to 101,000 kg. or 51 per cent and 45 per cent of the calculated volume of horn poached in Africa between 1970 and 1980, based on high and low assumptions of recruitment rate. That is, roughly half the horn being poached is reported in the Asian trade figures.

What happens to the other half of the horn trade? There are several possibilities.

- Rhino horn production could be overestimated. Though possible, this is unlikely. Counts of large mammals are generally biased on the low side, especially in the cases of the black rhino, a solitary species which tends to lie under cover during the day (Western, 1982). I suspect all the continental estimates are very low. For example, the 1970 figure of 65,000 was based on conservative assumptions at a time when the combined total of Luangwa Valley and Tsavo Park black rhinos alone was 18,000 to 21,000. In all likelihood the Africa-wide population was far greater than 65,000. Similarly, Zimbabwe rhinos, based on uncorrected aerial counts, make nearly half of the 1987 Africa-wide estimate. Yet aerial counts are invariably low for rhinos, often by several-fold (Goddard, 1970).
- Juvenile mortality could be underestimated. This again is unlikely, since the figures have been based on actual life-tables and field data on juvenile losses under heavy poaching.
- The poaching and horn recovery rate by poachers could be overestimated. This too is unlikely. Data from Amboseli give the minimum observed rates of poaching and horn removal. The recovery rates of horn by wildlife officials are of the order of a few per cent, indicating that the poachers, or corrupt wildlife employees, remove virtually all horns for trade. The 95 per cent decline in rhino since 1970 is testimony to the efficiency of poachers. Natural mortality, except for juveniles, has been insignificant over this period (Western and Sindiyo, 1972, Western, 1982).
- A large portion of the horn entering the market gces undetected. This is, in my estimation, the most plausible explanation. Since no markets have been detected in Africa, where the price would in any event be low compared to Asia, the missing trade must either enter known markets in larger quantities than detected, or is passing through unidentified markets. Both seem plausible. Taiwan was evidently a major importer in recent years, though the size of the market was not recognized until 1988 (see Martin this volume). Consignments are known to have been shipped to North Korea in diplomatic baggage, yet no import figures exist. The volume of rhino horns used for dagger handles has only been quantified for North Yemen, though horn is known to be used in other Arab states, such as Oman.

Implications

Trade studies have been extremely important in locating and defining the relative importance of rhino horn markets. However, comparisons with field data show that only a half or less of the horn entering the market is detected. There is some evidence of improvement, however, no doubt as the markets became better defined and the methods more rigorous. The same exercise done above, repeated for 1980 onwards, suggests that market surveys picked up between 59 per cent and 67 per cent based on low and high recruitment rates during this period. Given the bias of underestimating rhino numbers, I consider these to be optimistic figures.

The unabated decline in African rhinos during the 1980s (Fig. 1) shows that poaching has defied all efforts to ban the horn trade. There are obviously too many loopholes to slow a population crash through trade bans. The prospects are likely to worsen as the task of detecting fewer and fewer horns entering the market becomes more formidable and price incentives rise. Markets are likely to wither simply because supplies will dwindle to a trickle in the next three years or so. The market will dry up even faster if increasingly successful efforts to protect rhinos in the wild and in safe sanctuaries are strengthened. Redoubled efforts to consolidate and protect rhinos in safe locations could conceivably protect 3,000 of the remaining 3,800 black rhinos and quash the horn trade more effectively than trade bans.

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