

# New maps representing the historical and recent distribution of the African species of rhinoceros: *Diceros bicornis*, *Ceratotherium simum* and *Ceratotherium cottoni*

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## Abstract

The paper presents new and updated maps showing the historical and current range of the black, white and Nile rhinoceros. Distribution of the species is based on written and iconographical records, as well as museum specimens. The historical range reflects the situation from AD 1500 onwards (or the last part of the Holocene). The current range is divided into original and introduced populations.

## Résumé

Cet article présente de nouvelles cartes mises à jour qui montrent l'habitat historique et actuel du rhinocéros noir, blanc et du Nil. La distribution de l'espèce est basée sur des rapports écrits et iconographiques ainsi que sur des spécimens dans les musées. L'habitat historique reflète la situation à partir de l'année 1500 et après (c'est-à-dire la dernière partie de l'Holocène). L'habitat actuel est divisé d'après des populations originelles et introduites.

## Introduction

It is common practice in zoological encyclopaedias or monographs to provide maps of the historical and current distribution of a particular animal. These maps are extremely useful to show how widely a species ranged and to visualize the often extreme reduction of the areas where it can be found. This procedure is a powerful and useful conservation tool, because status figures can only be displayed in graphs that might need some mathematical background to be properly understood.

A survey of the available maps of the historical distribution of any of the six species of rhinoceros still extant reveals discrepancies in the interpretation of the data as well as a lack of definition of what is meant by historical. Some would say it is the range as it existed in 1700, or 1800, or a similar general date, without examining in too much detail why that particular year is chosen to be representative.

Our work with historical publications about the rhinoceros for several decades makes it abundantly obvious that the full potential of the old data has yet to be harvested. The sources are mostly available on the Rhino Resource Center ([www.rhinoresourcecenter.com](http://www.rhinoresourcecenter.com)), but it takes time and major effort to extract all information on past distribution. The data to be analysed of course include any mention in a published work or unpublished report that the species was seen or shot. Besides this, there are specimens with localities in museums and private collections, works of art including paintings, drawings and rock engravings, place names referring to the animal, and an array of other sources. If funding would ever be available, a historical atlas of the distribution records of all species of rhinoceros would be an incredible asset.

In this paper we present new maps of the historical distribution of the three extant species of rhinoceros in Africa, i.e. the black rhinoceros *Diceros bicornis* (Linnaeus, 1758), the white rhinoceros *Ceratotherium*

*simum* (Burchell, 1822) and the Nile rhinoceros *Ceratotherium cottoni* (Lydekker, 1908). *C. cottoni* was recently elevated to species rank by Groves et al. (2010), but the maps would of course be the same if the previous subspecific arrangement is preferred. The subspecies of the black rhinoceros (Rookmaaker 2011) are not separated in the map of *Diceros bicornis*.

## Sources of data

Today in conservation circles the most commonly consulted maps are those contained in the action plan by Emslie & Brooks (1999), which for the black rhino is copied from Cumming et al. (1990) and for the two then recognized subspecies of the white rhino is a combination of maps by Cumming et al. (1990) and Hillman-Smith et al. (1986). These historical maps are stated to represent the situation around 1700. Previous continent-wide maps or surveys containing a wealth of individual data are those by Zukowsky (1965) and Sidney (1965).

The oldest literary records available on the rhinoceros refer to South Africa from the middle of the 17th century. These were first comprehensively investigated and placed in an ecological context in the remarkable volumes by Jack Skead (1912–2006), recently edited as Skead et al. (2007, 2011). Rookmaaker (2001, 2002) discussed the near-extinction of the white rhino in the early 20th century. The extinction of the species in Zimbabwe was first highlighted by Rookmaaker (2003). All available information on rhinos seen or shot or studied in the period from 1795 to 1875 were studied by Rookmaaker (2008) and the results plotted on maps covering Botswana, Namibia, South Africa, Swaziland and Zimbabwe.

Yalden et al. (1986) and Rookmaaker & Kraft (2011) reviewed early records from Ethiopia and Somalia. Kingdon (1979) produced a remarkable historical map of distribution of rhinos in Kenya. Schomber (1966) and Hillman-Smith et al. (1986) studied the situation in Central Africa as regards the Nile rhinoceros.

The relatively restricted range in countries of West Africa was reviewed by Rookmaaker (2004). A specimen recently discovered by Antoine & Rookmaaker (2012) has extended the distribution of the black rhino into northern parts of Togo.

## Results

In our view, there is only one realistic way to portray the historical distribution of a particular species. Because records of even a large and prominent mammal like a rhinoceros are often relatively few in number, we must combine everything that might have relevance to their range. A map of historical distribution is therefore a representation of all records of the existence of the species, where it is assumed that if it is known to exist in a certain place in, say, 1850, or 1900, or 1950, or 2000, it also used to exist there at any time before such a date. If for instance, a rhinoceros would have been seen in 2010 in the montane forest on the east side of Mount Kenya, it is assumed that it is one of a population that always lived there. The map then draws a line around all these records that have been plotted on a map, and this we call the historical distribution or range of that species.

There is no particular known or defined measure as to how far back the historical range of a certain extant mammal can be known. Most written records of course refer to the period starting from the start of printed records, from around 1500. In this case, therefore, the historical element of our maps shows the range of the various species in the past five centuries, coinciding with the last stages of the Holocene.

There are, of course, plenty of pitfalls that make the construction of a historical map less easy than it seems (Skead 1962; Boshoff & Kerley 2010). Species distributions change in time and place, and animals move around. It is (almost) obvious that a rhinoceros only lives in places where the habitat is favourable, unless it is moving from one place to another. It is (almost) obvious that a rhinoceros would not be found close to human habitations unless it was left undisturbed. Rhinos could potentially be found on one side of a mountain and not on another, or on one side of a river and not on the other. Such relatively minor and very local distribution patterns can never be shown on continental maps of a historical distribution area and are therefore always ignored.

A map of historical distribution is generally assumed to reconstruct what may be called the original range of a species. Hence any area into which a species of rhino was actively introduced—usually in the period after 1960—that by chance lay outside the known and verified range would not be shown in this kind of map. It is therefore extremely important

to keep track of all translocations, reintroductions and introductions, although it is likely that the existing literature would not be adequate for this purpose. There are clear guidelines regarding the movement of rhino in continental Africa (Emslie et al. 2009) and it would be advisable to ensure that a full knowledge of historical records is part of all management policies.

Indications of the current distribution are based on the figures and notes in Emslie & Brooks (1999) and updated in Emslie (2008). The current data have been separated into two sets, which are indicated on the maps by two distinct symbols: 'O' for original and '+' for (re)introduced. For security reasons, these symbols are placed randomly within the boundaries of the countries in which the species is believed to

be present, and their placement emphatically has no relationship to the actual range or status. O is used in case of countries, where as far as we know the species has always existed within the past five centuries (or longer); + is used in case of countries—in a few cases parts of countries—where at one time the species was extinct, hence where all current populations have been reintroduced, or (where applicable) introduced.

The three maps showing the historical distribution of the black rhino, the white rhino and the Nile rhino are presented here (Figs. 1–3). They were first published by Antoine & Rookmaaker (2011) in a slightly different format, without, however, providing background into their preparation. It is envisaged to make these maps available on the Rhino Resource

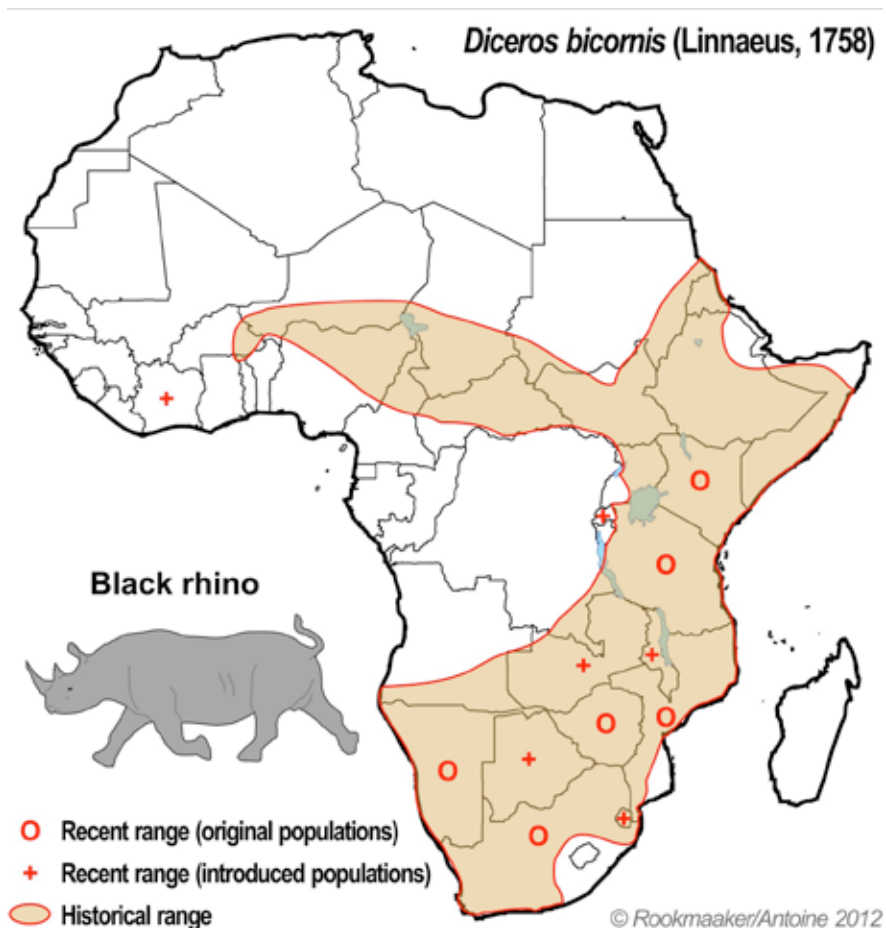


Figure 1. Historical and current distribution of the black rhinoceros *Diceros bicornis* (Linnaeus, 1758). The historical range in the period after AD 1500 is shown in grey. The current range is shown by the symbols 'O' for remnants of original populations and '+' for introduced or reintroduced populations.

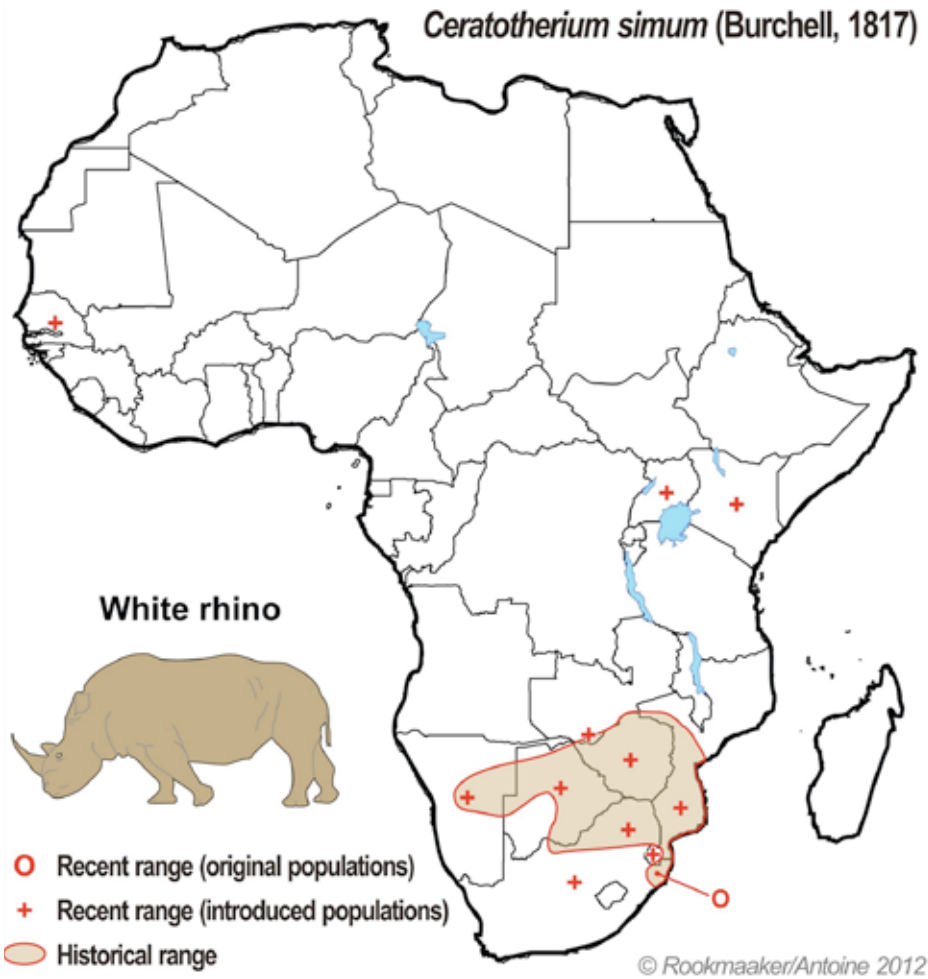


Figure 2. Historical and current distribution of the white rhinoceros *Ceratotherium simum* (Burchell, 1822). The historical range is shown in grey. The only original population remained in the early 20th century in parts of Zululand (KwaZulu-Natal, South Africa), and all other specimens now found on the African continent in wild or semi-wild conditions have been restocked from the Zululand remnants.

Center website ([www.rhinosourcecenter.com](http://www.rhinosourcecenter.com)) where users can view and download them to be used elsewhere with proper acknowledgements.

## Acknowledgements

This paper is part of the ongoing research of the Rhino Resource Center, sponsored by SOS Rhino, International Rhino Foundation, WWF Areas, Rhino Carhire and Save the Rhino International.

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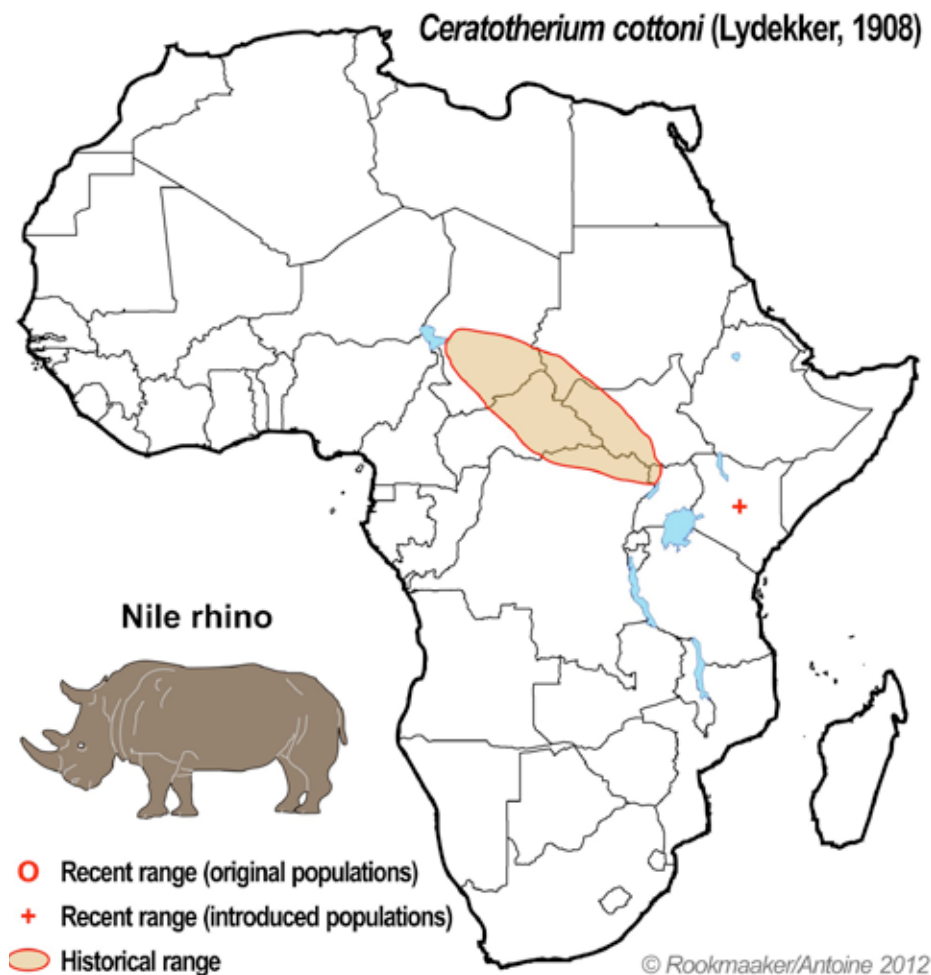


Figure 3. Historical and current distribution of the Nile rhinoceros *Ceratotherium cottoni* (Lydekker, 1908). The historical range is shown in grey. It is believed that by 2010 no animals remained in the wild (last seen in NE Congo).

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