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THE DISTRIBUTION AND STATUS OF THE RHINOCEROS, *DICERORHINUS SUMATRENSIS*, IN BORNEO — A REVIEW

by

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ABSTRACT

In the second half of the 19th century, the rhinoceros occurred throughout Borneo except southern Sarawak, northwestern Kalimantan and some parts of southern Kalimantan. The animal was extinct in the coastal and other populated areas in about 1930, especially in the southern part of Kalimantan. Presently some small populations remain, scattered over the Sarawak interior (if the rhinoceros survives at all there), northeastern Sabah, possibly also southern Sabah and around Mt. Kinabalu, and the interior of Central and East Kalimantan. It is estimated that some 15 to 25 rhinos are still alive in Borneo.

INTRODUCTION

Since 1840 the rhinoceros is known to inhabit Borneo, but agreement about its specific identity was not reached until 1895 (Rookmaaker, 1977). The Bornean rhinoceros is presently regarded as a subspecies of the two-horned Sumatran kind, *Dicerorhinus sumatrensis harrissoni* (Groves, 1965). Erroneous beliefs in the aphrodisiacal and medicinal properties of many rhinoceros parts, especially its horn, have reduced the animal to near-extinction. Protective laws are available (Chin, 1971; Van Strien, 1974: 62-63) and generally it is tried to practice them, but the difficulties are great. The survival of the rhinoceros to this day is mainly due to its occurrence in remote and uninhabitable regions. Consequently, studying it in the field, although necessary, becomes very hard as has been experienced in supposedly better populated areas in Sumatra and Malaysia.

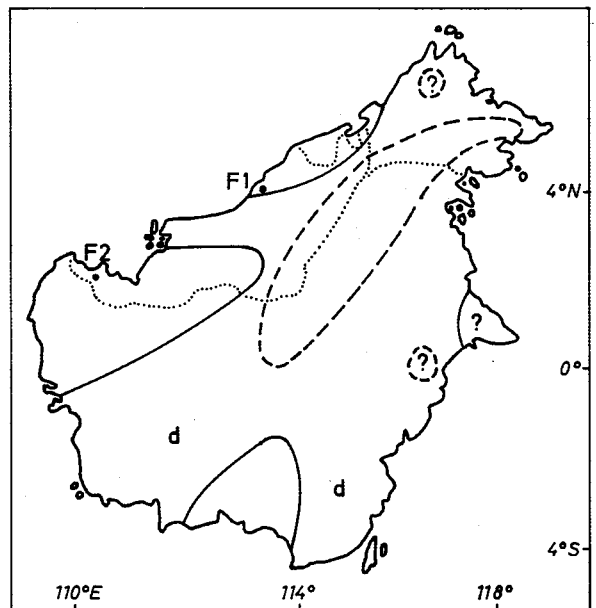
Therefore, the literature on Borneo remains as the only practical source to establish the present and former distribution of the rhinoceros there. More written statements about Borneo exist than one supposes, but they include rather few referen-

ces to the rhinoceros. The following is an attempt to collect these.

For the latitudes and longitudes of the localities I may refer to "Atlas van tropisch Nederland" (anonymous, 1938) and "Gazetteer no. 13" (anonymous, 1955).

DISTRIBUTION

Some distribution maps covering the whole island were published earlier. According to Guggisberg



Map 1. Sketch-map of Borneo showing the rhinoceros distribution. political boundaries; — possible boundary of distribution ca. 1850; - - - - approximate boundaries of areas in which rhinoceros populations can be expected today. Fossil evidence shown as F1 (Niah cave), and F2 (Bau); d shows areas where the rhinoceros became extinct around 1930.

(1966: 104), the animal lived throughout Borneo in 1850, but "presently" only in northern Sarawak and (unconfirmed) in Kotawaringin, East Kutai and along the Reyang river. Groves (1967: 225) shows localities of some museum specimens. Krumbiegel (1960: 16, left) and Groves & Kurt (1972: fig. 4) doubt the former distribution in southern and southwestern parts. Van Strien's maps (1974: 33, 34) exhibit the records he could find in the literature. His map of the present occurrence shows Mt. Kinabalu and the East Kutai reserve.

1. SARAWAK

1.1. Fossil records

The excavations in the Niah cave have unearthed fossil rhinoceros material in several layers, the oldest 183 cm deep corresponding with a C¹⁴ date of $30,673 \pm 700$ years B.C. (upper pleistocene). The material has been discussed by Harrison (1957: 164, pl. Pb; 1961b: 90) and Medway (1958; 1959: 157-158; 1964: 37; especially 1965b: 77-79). The fragments must belong to *D. sumatrensis*, although none of them can be identified unequivocally. A tendency to decrease in average size from the pleistocene to the present, demonstrated in several large mammals, has been described for *Rhinoceros sondaicus* Desmarest, 1822, by Hooijer (1946a: 27; 1946b). Similarly, recent Sumatran teeth of *D. sumatrensis* are normally smaller than the subfossil ones from that island (Hooijer, 1946a: 16-29), which Sody (1946) named *D. s. eugenei*. There is some evidence for a similar trend towards size diminution in Borneo material (Medway, 1965b: 81; Groves & Kurt, 1972: 3), but it is insufficient to draw any certain conclusions.

The British Museum received in 1884, from P. L. Sclater, some fossil rhinoceros bones and upper molars, found in an alluvial cave deposit (upper pleistocene?) near Bau in southwestern Sarawak, at a depth of some 20 m (Beccari, 1904: 135; Medway, 1965b: 80) — not at Paku (Banks, 1931: 21). The skeleton was catalogued under *D. sumatrensis*, but the molars (British Museum (Natural History) cat. no. M. 1968) were "provisionally referred to" *R. sondaicus* (cf. Lydekker, 1886: 129), as was noted by Banks (1931: 21)

and Loch (1937: 145). Lydekker used the incorrect criteria of Busk (1869) to identify the teeth. Therefore Hooijer (1945: 253; 1946a: 10) suspected that they in fact belonged to *D. sumatrensis*, which was later confirmed by Medway (1965b: 80, pl. XXI) who, unlike Hooijer, was able to inspect the actual specimens.

Busk (1869) discussed two further second upper molars from Sarawak but their origin is unknown (Rookmaaker, 1977).

1.2. Recent records

Northern Sarawak:

Harrison (1949: 71): formerly upper Limbang, especially Mt. Batu Lawi. — Banks (1931: 19): Lawas interior. — Banks (1935: 329): Mt. Mulu; none there in 1946 (Harrison, 1949: 71). — Harrison (1949: 71; 1955: 134; 1956: 264): Kelabit plateau "within living memory", or near Raya river.

Upper Baram river:

Banks (1931: 19), Harrison (1949: 71): Baram district. — Harrison (1956: 264): 79 rhinos killed in Baram district, 1925-1931. — Arnold (1959: 94): hunting on Usun Apau plateau, first half 20th century; no traces in 1959. — Mjöberg (1929: 68): Mt. Murud, 1922. — Cambridge Zoological Museum, no. 6383: Mt. Kalulong, Baram district; donated by Hose in 1896 (Groves & Kurt, 1972: fig. 2). — Cambridge Zoological Museum, no. 6381: Baram district; donated by Hose in 1898 (Groves, in litt., June 1975). — Sarawak Museum, Kuching, no. 64.19: lower jaw from Baram (Chin, in litt., February 1976).

Reyang river:

Wallace (1874), Bartlett (1891), Banks (1931: 19), Harrison (1965: 102): upper course of Reyang river. — Harrison (1955: 134), Chin (in litt., February 1976): Baleh, upper Reyang river; front horn confiscated (Sarawak Museum, Kuching, no. 59/64). — Banks (1931: 19): strays in ulu Oya and Mukah¹⁾. — Sarawak Museum, no. 64.20: Jalat, 1926 (Chin, in litt., February 1976). — Sarawak Museum: several skulls and horns from Reyang district (Bartlett, 1891; Chin, in litt., February 1976).

Southern Sarawak:

Banks (1931: 19): never found "on the left bank of the Rejang or down into Saribas and Sarawak proper", cf. Gomes (1911: 149) and Low (1848). Only fossil remains from Bau (see § 1.1).

1.3. Conclusion

In the first decennia of this century the species occurred from the Lawas interior in the north (ca 04°30'N) southward along the border with

¹⁾ ulu = headwaters.

Kalimantan (ulu Baram and ulu Reyang). The regions nearer to the coast were inhabited formerly (fossil evidence in Niah) but in more recent times only occasionally. The rhinoceros recently did not occur south of the Reyang river, but again fossil remains were found there, at Bau.

2. SABAH

2.1. Recent records

General:

Raffles Museum, Singapore: North Borneo, donated by Rowe in 1901 (Hanitsch, 1908: 8). — Bristol City Museum, no. A. 1031: "British Borneo" (Groves, in litt., June 1975). — De Silva (1968: 145): one seen by member of Forest Department in 1957. — De Silva (in litt., June 1975): one seen in 1969 and evidence of rhinoceros found in 1971 and 1974.

Sandakan district:

Pryer (1881: 394): specimens and tracks often seen near Sandakan. — Burbidge (1880: 302): young shot on Sagaliad river, 20 miles from Sandakan, by T. S. Dobree. — Harrison (1956: 266-267): in 1889 H. Edgar Hughes shot one along the lower (?) Kinabatangan river. — Several specimens were sent to European museums from Sandakan in the 19th century, cf. Rookmaaker (1977: 59). — No 20th century records from this region.

Northeastern Sabah:

Harrison (1949: 71; 1965: 102): some survivors in northeastern Sabah. — Burgess (1961: 150): Darvel bay forests and Dent peninsula; in 1958 indications of illegal hunting in the Darvel bay district. — Medway (1965a: 155): Dent peninsula. — Dingley (in litt., January 1975): specimen killed in Semporna/Lahad Datu area, ca. 1970. — British Museum (Natural History), no. 1901.8.15.1.: Suan-Lambah (Groves, 1965: 130). — Zoologisches Museum A. Humboldt, Berlin, no. A 85.10: La Datu (= ? Lahad Datu) (Groves, in litt., June 1975). — Davis (1962: 120): mounted head from Tingkayu river, collected in 1927, seen in Singapore National Museum, but it is no longer there (Singapore National Museum, in litt., February 1975).

Segama river:

Medway (1965a: 155): Bole river on Segama river. — MacKinnon (1970; 1974: 37, 112): tracks infrequently seen in the ulu Segama in 1968-1970. — Medway (1965a: 155): ulu Kuamat. — Zoologische Staatssammlung, München, nos. 1903/1 and 1903/2: Segama river (Groves, in litt., June 1975).

Southern Sabah:

Burgess (1961: 150): increase in Interior Residency in 1957. — Harrison (1949: 71): single rhino recorded in upper Padas early 1946. — Little information from this region along the Kalimantan border is recorded.

Upper Kinabatangan:

Harrison (1956: 265), Burgess (1961: 150): upper Kinabatangan river. — Burgess (loc. cit.): in 1958 a conviction in Ranau for illegally shooting a rhinoceros.

Western Sabah:

Sandilands (1974): Tambunan man told him that permits to shoot one specimen were sold for \$25 between 1903 and 1928. He found tracks in the ulu Karamuak in 1960, but none in 1974. — Harrison (1956: 265): around Mt. Trus Madi and eastward to the Kinabatangan river, asserted by government officials in 1952; no traces there in 1956. — Harrison (1956: 266): Pretyman shot a rhinoceros near Kota Kinabalu, early this century. — British Museum (Natural History), no. 1875.8.9.18.: mainland opposite Labuan Island, according to Jentink (1884: 556); possibly incorrect.

Northwestern Sabah:

Medway (1965a: 155): J. L. Harrison saw tracks on Mt. Kinabalu in 1962. — Corner (1964: 17, 20): Mt. Kinabalu, 8,000 feet, toothmarks on bark of a tree; a few animals expected on 10,000 feet eastern ridge. — Jenkins (1971: 177), Harroy (1971: 337), Van Strien (1974: 34): Mt. Kinabalu, based on Corner and Medway. — Museum specimen from Mt. Kinabalu incorrectly shown on the map in Groves (1967: 225), repeated by Van Strien (1974: 31). — Jenkins (1971: 177): unauthenticated record from Mt. Tambuyokan in 1970. — Evans (1922: 58): occasionally seen "in the range which runs from Kinabalu in the direction of Kudat."

2.2. Conclusion

Formerly the rhinoceros was probably distributed throughout Sabah. Reports from the first half of this century are almost nonexistent. Presently it may live scattered from the ulu Kinabatangan southward to the border with Kalimantan, and from the ulu Segama eastward along the Darvel bay to the Dent peninsula. In those regions, at least, occasionally rhinos are killed or poached, or their footprints are seen. This situation will not last very long if nothing is done. The present occurrence on Mt. Kinabalu is doubtful since the few existing records are all very vague. However, it is not totally impossible.

3. BRUNEI

It is questionable whether the rhinoceros ever existed in Brunei. Reports seem to be absent (Van Strien, 1974: 63). Van Lynden & Groll (1851: 565), without direct experience in the region, said it would occur in Brunei. However, Brunei formerly included parts of Sarawak. If the rhinoceros ever occurred within Brunei, it perished there early in the 19th century at the latest.

4. KALIMANTAN

Both Zondag (1931: 222) and Westermann (1939: 352-354) reviewed the distribution of the rhinoceros in the Dutch, now Indonesian, part of Borneo. Besides earlier publications, they had some unpublished reports at their disposal. Their maps are an important source for the rhinoceros occurrence during the 1930's. The number of records from a certain area, marked on their maps, are here given as: Zondag, or Westermann, 1 ×, 2 ×, etc. Other significant contributions were the accounts by Witkamp (1932) for the Kutai province, and by Pfeffer (1958) for the Kayan river area (cf. anonymous, 1958).

Two skulls, the localities of which I could not find, may be mentioned here, although it is uncertain that they came from Kalimantan. They are: Smithsonian Institution, Washington, no. 19955: Belupaiah, Lino river; and Academy of Science, Philadelphia: Selat river (Groves, in litt., June 1975).

4.1. Recent records

Northern Kalimantan Timur (= northern part of East Kalimantan):

Voogd & Rengers Hora Siccama (1939: 141): "Tidoengsche landen" (= northern Kalimantan). — Harrisson (1965: 102): some survivors in this region in 1965. — Heynsius-Viruly & Van Heurn (1935: 48): from Sabah border southward to Sesayap river. — Schneeberger (1945: 562): Sulon valley. — Zondag (1931, 1 ×), Westermann (1939, 2 ×): between Sarawak border and the Pakerayan river. — Mjöberg (1929: 68): Mt. Murud. — Zondag (1931, 2 ×), Westermann (1939, 5 ×), Heynsius-Viruly & Van Heurn (1935: 48): source areas of the Malinau and Tubu rivers. — Westermann (1939: 353): ulu Sekatok river.

Ulu Bahau river:

Zoologische Staatssammlung, München, no. 1908/571: Kapan Mts. (Groves, 1967: 225 — wrong place on his map, cf. Van Strien, 1974: 31). — Pfeffer (1958: 133-137): chief of kampong Long-Laat (upper Bahau) sold a rhinoceros horn of unknown origin to a trader in Tanjungselor (1957); Punans of ulu Bahau killed at least 27 rhinos, 1925-1945. — Pfeffer (1958: 135; 1963: 89-90): one seen on the bank of the Aran river (affluent of Bahau) in 1953, but none later. — Piazzini (1963: 163): upper Bahau river. — Westermann (1939, 1 ×): between Bahau and upper Kayan rivers. — Harrisson (1949: 71; 1956: 263 footnote; 1975: 71): one seen in the same region at 3,000 feet in October 1945. — Pfeffer (1958: 137): tracks of two animals seen there, near Long-Mesaan, May-June 1957.

Upper Kayan river (= "Apo Kayan"):

Heynsius-Viruly & Van Heurn (1935: 48), Voogd & Rengers Hora Siccama (1939: 141): Apo Kayan. — Tehupeiorij (1906: 87): his cook saw one on Mudung Butu in 1903. — Westermann (1939: 353): between Long Heban and Kiham (= rapid) Awon. — Lumholtz (1921: 38): tracks along Kayan river. — Tillema (1936: 45): tracks in Kiham region of the Kayan river. — Merens (1910: 545): one shot in that region. — Tehupeiorij (1906: 191): inhabitants of Longuro gave him rhinohorns in 1904; Jongejans (1922: 165) saw a large horn in that village. — Westermann (1939), Zondag (1931): ulus of Iwan and Marung rivers (tributaries of upper Kayan), viz., along the Sarawak border, and along "lower Kayan Iut." — Pfeffer (1958: 135): one killed near Nameh in early 1956. — Pfeffer (1958: 134-135): traces seen by headman of Long Berini on right bank of the Kayan river in March/April 1957. — Fischer (1910: 278): one shot on Beta river in 1906.

Upper Mahakam river:

Mjöberg (1929: 113): one seen in Babuin Mts. (between Kayan and Mahakam). — Mjöberg (1930: 11): group of four in source area of Boh river, a unique observation! — Nieuwenhuis (1900): one seen in upper Mahakam region (: 61); tracks on Batu Ajo (= ? Mt. Batuajau) (: 319-320). — Nieuwenhuis (1904): tracks on Batu Situn (: 361) and Batu Lesong (: 392). — Medway (1965a: 156): Raven saw tracks at Merah river in 1914. — Smithsonian Institution, Washington, no. 98854: Mahakam river (Groves, in litt., June 1975).

Lower Kayan and Berau rivers:

Zondag (1931: 222): one record on lower Kayan river, not repeated by Westermann (1939). — Pfeffer (1958: 133): Mara, 1957. — Tillema (1936: 45): trader in Muarapangan had several horns and nails in stock. — Pfeffer (1958): man from Long-Pudjungan saw footprints of two animals between the Kayan and the Kelai rivers, June-July 1956 (: 134); some reported there in 1957 (: 135). — Pfeffer (1958: 133): rhino killed by man from Long Liang in June 1957, between Kelai and Seggah rivers, and tracks of two others seen. — Tehupeiorij (1906: 47, 101): trade in horns recorded for upper Kelai river. — Westermann (1939: 353): in 1935 scarcely around Nyapa and Suwaran Mts. (south of Tanjungredeb). — Westermann (loc. cit.): never recorded near Sangkulirang.

West Kutai:

Witkamp (1932: 172): traces on upper course of Atan river, affluent of the Klindjau river, in 1924. — Buys (1927: 45), Endert (1927: 173): tracks on Kongkemul (Mt. Kemul) seen by Dutch Midden-Oost Borneo expedition, 1925. — Witkamp (1932: 172), Heynsius-Viruly & Van Heurn (1935: 48): mountain range along source areas of Belayan, Klindjau, Telen and Wahau rivers.

East Kutai:

Bock (1887: 111): sultan had horn of rhino shot near Tenggarong. — Witkamp (1932: 172): relatively common in 1920's in mountains between Rantau and Telen rivers on one side and Street Makassar on the other; also little

north of Samarinda, on upper Separi, upper Karangmumus and upper Kutailama rivers; one shot there in 1905; traces often seen in 1905-1907. — Museum Bogor: Bungalon river (Groves, in litt., January 1976). — The Kutai national park (3,060 km²), established 10 July 1936, harboured some rhinos (anonymous, 1937b: 20; 1937c: 274); recently some expected (Van Strien, 1974: 35), but no unequivocal records exist. — Witkamp (1932): Kutai river is southern boundary of rhino range in Kutai province. Keller (1932), however, saw tracks and living specimen in source area of the Kembodja and Nangha river area. — Zondag (loc. cit.), Heynsius-Viruly & Van (1939: 354) suggests that the animal wandered from more southern regions (?).

Kalimantan Selatan (= South Kalimantan):

Lyon (1911: 58): until "recently" at Manungal river (= Menunggul river), Pamukan bay. — Zondag (1931: 223), Westermann (1939: 345): Mt. Lumut area and ulu Negara river, north of Tanjung; scarce in upper Pasir river area. — Zondag (loc. cit.), Heynsius-Viruly & Van Heurn (1935: 48): formerly in Martapura district, but there exterminated in early 1930's. — No later reports.

Kalimantan Tengah (= Central Kalimantan):

Heynsius-Viruly & Van Heurn (1935: 48): Buntok (on Barito river), unconfirmed. — Schwane (1853: 36), Zondag (1931, 1 X), Westermann (1939, 1 X): upper Barito river. — Müller (1840: 39): upper Kahayan river. — Zondag (1931, 3 X), Westermann (1939, 4 X): ulu Mendawai (= Katingan) river. — Hoogerwerf & Van Steenis (1936: 97), anonymous (1937c: 274): frequent on and around Mt. Raya. — Pfeffer (1958: 137): presently extinct there. — Van Lynden & Groll (1851: 565), Zondag (1931, 4 X), Westermann (1939, 4 X), Voogd & Rengers Hora Siccama (1939: 141): Kotawaringin district, including the southern part, which is doubted by Westermann (1939: 354).

Kalimantan Barat (= West Kalimantan):

Büttikofer (in Jentink, 1897: 64): tracks on Mt. Liang Kubung, but not in surroundings. — Büttikofer (loc. cit.), Van Balen (1914: 219), Voogd & Rengers Hora Siccama (1939: 139): source areas of southern tributaries of upper Kapuas and Melawai rivers. — Lumbholtz (1921: 177): scarce north and northwest of Tamalöe (?). — Lyon (1911: 54), anonymous (1937a: 14), Voogd & Rengers Hora Siccama (1939: 139): Mt. Palung (= Mt. Panti, in districts Simpang, Matan and Sukadana). — Lyon (1911): "upper Simpang about [Mt.] Batu Dayeu" (Simpang river) (: 54); near Mt. Kedio (= Kedijo) (: 56). — Veth (1854: 38), Büttikofer (loc. cit.): unknown from (lower course of) Kapuas river.

4.2. Conclusion

Once the rhinoceros inhabited most of Kalimantan. It probably did not occur, during the last centuries at least, in: (1) the southern part of Central Kalimantan, roughly between Banjarmasin and Kotawaringin; (2) in the point of East Kalimantan near

Sangkulirang (rhinoceros presence in this area is shown on the map of Van Strien (1974: 33), but I have been unable to find the record in his text); (3) in West Kalimantan north of the Kapuas river, nor just south of it in the lower part of its course. The reason for the total lack of records from these regions, and my subsequent conclusion that the animal never was found there, is not clear to me. The kind of landscape and vegetation, however, may have played a role. The rhinoceros had perished from most of the other southern areas (southern Kalimantan Barat, Kotawaringin and Kalimantan Selatan) by the 1930's.

The present distribution can only be guessed since practically no reports later than 1945 are known. A few wandering individuals, or tiny remnant populations, may still occur in the ulus of the Mahakam, Kayan and Bahau rivers, and in northern Kalimantan Timur. More exact information does not exist.

STATUS

The number of rhinoceroses in the different parts of Borneo has been estimated several times, as can be seen in table I. Due to the lack of sufficient data, most of them can be no more than guesses. A decline, mainly caused by extensive hunting, is more or less visible.

The animal must have been quite numerous at the end of the 19th century, especially in Sabah. H. N. Ridley "passed four in one trip" near Sandakan (Shelford, 1916: 41). Similar statements are found in Pryer (1881: 394), anonymous (1886) and Bartlett (1891).

A few examples of the rhinoceros slaughter in our century should be given. In the 1920's 36 trophies came to Belaga (Sarawak) within two years (Banks, 1931: 20). Near Marudi (Sarawak) 79 rhinos were killed between 1925 and 1931 according to official records (Harrison, 1956: 264). From 1919 to 1927, 344 kg rhino horn was exported from the Dutch Netherlands Indies excluding Java. Tanjungselor was the main port for this product which was shipped either to Singapore or directly to China (Dammerman, 1929: 8, 84-85).

Whether the rhinoceros today still exists in Sarawak is unknown. If it survives, there are, very

TABLE I

Estimates of the rhinoceros population in Borneo.

| Source | Total | Sarawak | Sabah | Kalimantan |
|-----------------------|-------|-------------------|----------------|------------|
| Pryer, 1881: 394 | — | — | frequent | — |
| Bartlett, 1891: 655 | — | rare | numerous | common |
| Shelford, 1916: 41 | — | — | common | — |
| Banks, 1931: 20 | — | common | — | — |
| Harrisson, 1949: 71 | — | none? | many | some |
| Harrisson, 1955: 134 | — | 2-3 | some | handful |
| Harrisson, 1956: 265 | — | <2 | very few | a few |
| Pfeffer, 1958: 133 | — | none | none | some |
| Harrisson, 1961a: 127 | 30 | — | 10? | — |
| Burgess, 1961: 150 | — | — | 20-30 | — |
| Ripley, 1964: 149 | 20 | — | — | — |
| Harrisson, 1965: 102 | — | a few? | 11-13 | 10 (5?) |
| Simon, 1967 | 10 | — | — | — |
| Anderson, 1968: 500 | — | virtually extinct | — | — |
| De Silva, 1968: 145 | — | — | nearly extinct | — |
| Carson, 1968: 496 | — | — | extinct soon | — |
| MacKinnon, 1970: 347 | — | — | <100 | — |
| Van Strien, 1974: 35 | — | extinct? | few | few |
| Harrisson, 1975: 71 | 10-20 | none | 10-20 | 1-2 |
| Present study | 15-25 | 0-3 | 10-20 | 5 |

optimistically, not more than three individuals. The situation in Sabah seems somewhat better. There might be between 10 and 20 rhinos spread over some parts of Sabah (mentioned above), with the odds lying on the lower side. I am also confident that some individuals survive in Kalimantan, but probably not more than five. How long these animals will be able to remain hidden from the human eye — their only chance of survival — must remain unanswered.

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