

HOW MANY RHINOS ARE THERE?

Just as an investor needs a full set of company accounts to make informed investment decisions, rhino managers need estimates of rhino numbers (and age/sex structures, mortality data, inter-calving intervals etc.), to assess population size and performance, and decide how best to manage the population to ensure good breeding performance is maintained.

Richard Emslie | Scientific Officer, IUCN SSC African Rhino Specialist Group

People often think counting rhinos is easy; you just fly a plane around a reserve and count the rhino you see. In reality, counting rhinos is tricky, as rhinos do not only occur in open flat areas without trees. Often a proportion of rhinos will remain undetected; either hidden by vegetation or terrain. Some animals may be missed if they are directly under the plane or if observers fail to see them.

Black rhinos are even worse to count from the air as they sometimes only move after being flown over. They also prefer areas with thicker bush. With transect counts, you could fly once over an area and record a minimum number that is completely different to the number actually on the ground.

To be useful, managers need accurate estimates of the true numbers and densities of animals. Ideally one uses counting methods, which if repeated give pretty similar results (precise) and estimate true numbers (unbiased). Count accuracy is a function of two things – bias and precision. In some years, visibility conditions or observers may be better, meaning it is easier to see rhino, which can further complicate interpretation of population estimates over time.

Generally due to cost, one cannot afford to repeat counts; but if a counting method is repeated and produces very variable results (in other words, imprecise) then it is pretty useless, as managers can't be sure if differences between counts over time reflect reality or could be a sampling error.

Block counting is used to estimate rhino numbers from the air when counting very large areas where ground based monitoring is not practical, such as Kruger and Etosha National Parks. In a block count helicopters intensively fly in a criss-cross pattern within blocks demarcated by GPS. If observers don't see a rhino on the first fly past, they have a good chance of seeing it on the second or third fly past since it may be moving and easier to spot.

It is prohibitively expensive to count 100% of a huge park using helicopter block counts, so scientists usually count a random but significant sample of blocks (or walk distance-sampling line transects on the ground multiple times), and use statistical analytical methods to convert the raw data into an estimate of the number of rhinos (4), plus a measure of the confidence in the estimate. This is usually shown by scientists as a 'confidence level'.

It is not possible to reliably detect small changes in rhino numbers year-on-year using such methods, and this

Despite white rhinos being big and preferring open areas, if one flies straight,

aerial transects experience shows that in hillier bushveld areas you can miss a significant proportion

of rhino (as much as 40% in Hluhluwe-iMfolozi Park). If uncorrected, such counts simply provide a biased minimum number that underestimates true population size. This is why other methods are usually used to estimate rhino numbers.

Some counting methods use a distance-sampling approach where you not only count animals along a transect, but if on the ground you calculate the perpendicular distance of the animals to the cut transect line (1). White rhinos in Hluhluwe-iMfolozi Park are monitored this way. If in the air, you record rhino sightings according to which band they are seen in as you go further from the plane, to the outer edge of the transect area. In general the assumption is you count all (or most) of the rhinos on the transect line but the further you go, the fewer will be counted. In effect, distance sampling makes allowance for animals being missed further out along the transect and uses all sightings to create an estimate of the true number of animals, with confidence levels. (2) (3)



Above and right: Rangers on foot patrol search for rhinos and use binoculars for identification

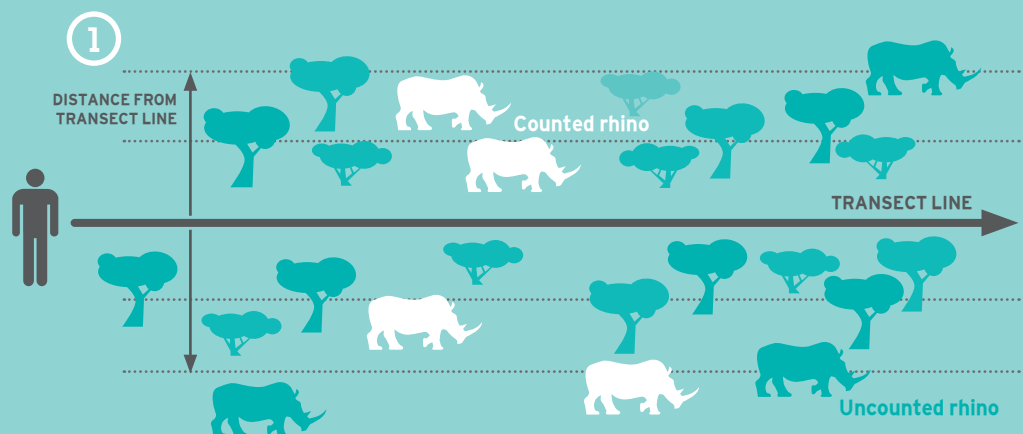
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DAVE ROBERTSON

The distance-sampling approach

How to estimate rhino populations in the bush



coupled with the high survey costs is why counts are usually undertaken every two to three years in the big reserves. There is generally a trade-off between precision (tighter confidence levels) and the amount of sampling (cost). Although intensive block counts and distance-sampling surveys both seek to estimate true numbers of animals, block counts are better as they are usually much more precise.

However, for most smaller reserves that can be more intensively patrolled, individual identification methods provide the most reliable, accurate and precise rhino population estimates. In many reserves, management may know exactly how many rhinos they have. ID-based monitoring methods start to become impractical in either vast areas or those with more than approximately 400 rhinos.

When observing a rhino, you might see one or more notches cut in the outside of the ear. This animal is individually recognisable. Each rhino (or a sample of the rhino in the reserve) that are ear-notched will have different ear notch patterns, allowing field rangers on patrol with binoculars to easily identify them as specific individuals. Figure 1 illustrates the Zimbabwe ear-notch system. Modern digital cameras can also help distinguish between rhinos that have not been notched (for example, based on horn configuration).

If rhinos are seen regularly, you will know how many there are in a reserve without the need for statistics. You also get an early warning from your monitoring if one is missing. However, even if rhinos are seen less frequently and/or not all have ear-notches, then Rhino Bayesian Mark Recapture software can be used to analyse sightings and re-sightings of rhinos to produce population estimates with confidence levels.

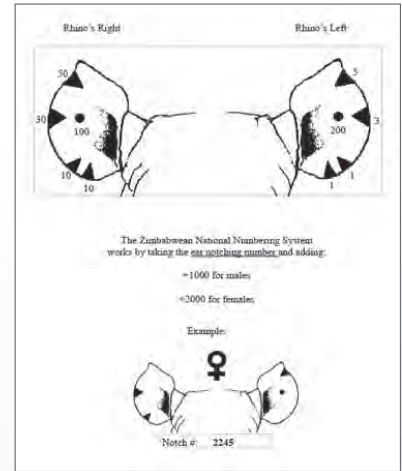
Mark-recapture statistics essentially use the sighting/re-sighting data to calculate the probabilities of there being different numbers of rhinos that you haven't seen yet. It adds the best estimate of the number not seen to the known minimum number seen, to give a total population estimate.

The method also allows you to derive confidence levels around your population estimate.

Most rhino population estimates today are based on ID methods, and provided there is ample ground coverage these can be pretty accurate. However, a significant proportion of rhinos live in large populations in vast areas, and here at best, estimates have a certain degree of uncertainty.

Thus, when you see estimates for total numbers of 'true' rhinos in Africa this represents a best estimate of the number. However, be aware that there is a degree of uncertainty around this figure, given the confidence levels around many individual population estimates (especially of the largest populations). In general, rhino population estimates are more accurate than many other species, and the actual rhino numbers are probably within $\pm 5-10\%$ of the total estimate. Additional information such as mortalities, inter-calving intervals, proportions of adult females with calves and ages at first calving also help assist with interpretation of population trends and performance.

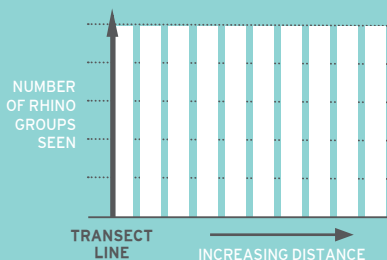
Fig 1 Zimbabwean ear notch system



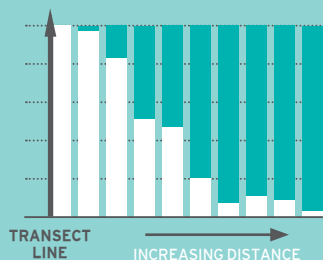
Grants

Save the Rhino and USFWS RTCF are each giving \$10,000 to support the work of the AfRSG Secretariat for the period July 2013–June 2014, while individuals have given further donations totalling £874. Our thanks to all donors.

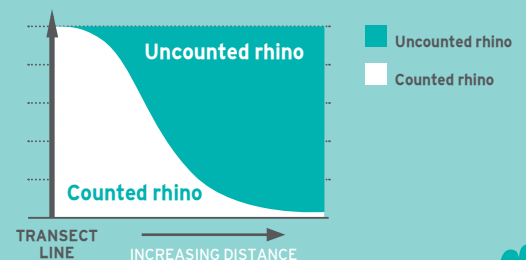
2 If we could see the entire rhino population at any distance, this is what the graph would look like



3 But further from the transect line, fewer rhinos can be seen (counted), so estimation must allow for 'uncounted' rhino



4 We use statistical analytical methods to cover the raw data into an estimate of the rhino population



Star fundraisers

Strong winds and seriously tough hills did not stop supporter **Carla Dray** running the Beachy Head Marathon in rhino costume (below). Thank you to Carla for running for rhinos and raising over £600



CARLA DRAY

Mat Hartley has raised over £3,000 so far through his challenge 'Braai 365'. Starting on the 18 May 2013, Mat has held a BBQ (or 'braai') every day – and will continue to do so for a year, ending on 17 May 2014. Follow Mat's progress and give him your support on Facebook www.facebook.com/Braai365

Thank you to **Steven Wilson** (left) who ran the New York Marathon in November. He ran for two charities, raising over £1,000 for Save the Rhino and also fundraising for tiger conservation through the David Shepherd Wildlife Foundation



STEVEN WILSON

In September, **Freddie Menzies** cycled from London to Portugal with his team to raise money for Save the Rhino and Shooting Star Chase. A huge thank you to Freddie who raised more than £4,000, an amazing total

Thanks to the **pupils of Broadford Primary School** in Australia who raised £440 through a Save the Rhino activity week. Their creative ideas included a cake stall, a sponge toss at unlucky teachers, a lunch-time disco and non-uniform day

A huge thank you to **William Rome**, aged 10, who has spent the last four months fundraising for rhino conservation and has raised over £600 so far. William has kindly donated money from pet-sitting and gained donations by spreading the word amongst friends and family



PLYMOUTH ZOOLOGICAL SOCIETY

Thank you to **Plymouth Zoological Society** (above), who raised £162 for Mkomazi Rhino Sanctuary in Tanzania, by holding a cake sale at their university

Feeling inspired to do your own fundraising?

Get in touch with laura@savetherhino.org or contact katherine@savetherhino.org for school fundraising



JOSHUA DUNLOP

Virgin Money London Marathon 2014

A team of 64 runners will take on the London Marathon on **Sunday 13 April 2014**, 18 of whom will be taking on the challenge in rhino costume. With an electric atmosphere, London Marathon day is always a great day out – why not come down to London for the day and see if you can spot them? You can make a donation to support the team on our website at www.savetherhino.org/donate

Rhino Mayday 2014

Our annual Rhino Mayday will take place on **Thursday 1 May 2014** at the Grant Museum of Zoology, UCL. Join us to hear top rhino-experts – rhino programme managers, zoo staff, and academics – as they talk about the latest debates in rhino conservation and share insights into each of their specialist subjects. You'll have the opportunity to join in our lively panel debate and also visit the Grant Museum of Zoology, home to a whole host of weird and wonderful exhibits, including a Javan rhino skull. Tickets at £15 are on sale now. Visit www.savetherhino.org/events or call **020 7357 7474**

EC4 concert raises £3,800

Save the Rhino was the beneficiary of EC4 Music's Christmas concert, **An Evening of Seasonal Choral Music**, held on Wednesday 18 December 2013. We are deeply grateful for the support of EC4 Music through this thoroughly enjoyable event which raised £3,800 for rhino conservation. A special thank you to **Tim, Andrew and Lowri** for their superb organisation, and all the **EC4 choir**.



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Ride for rhinos

Save the Rhino is looking for team members for the **Prudential RideLondon-Surrey 100** on **Sunday 10 August 2014**. Taking place on closed roads, this 100-mile ride through London and the Surrey Hills will test your endurance and give you a day to remember, as you join the buzzing atmosphere alongside thousands of other cyclists.

Laura Adams | Events Manager

What you can expect from us

- A team evening at our office to meet other rhino cyclists
- Regular team emails from Save the Rhino
- Fundraising information pack, magazine and rhino pin badge
- A cycling jersey to wear for training and on the day
- A finish-line picnic on Sunday 10 August in Green Park
- A thank-you prize for our top fundraiser!



Our 2013 team said...

“ I couldn't have asked for anything else from the Save the Rhino team. I felt the info in the run-up to the event was perfect, and the jerseys were fab! Steph Smits

It's the first time I've actively supported Save the Rhino and I really enjoyed doing so... I would readily do this again, or recommend someone else to do the same. Martin Lawson

I thought the regular updates were useful. I liked the jersey very much – good design and good quality. The picnic and refreshments afterwards were a nice touch Michael Stollery ”

Want to ride for rhinos?

Get in touch with laura@savetherhino.org

SAVE THE RHINO HEROES



We can be heroes!

We kept them a secret until the night, but we can now reveal the heroes chosen by our six speakers at November's fundraising dinner.

Laura Adams | Events Manager

Pen Hadow chose Robert Falcon Scott & Sir Peter Scott

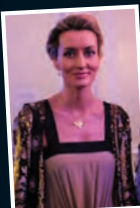


In the early 1900s, Robert Falcon Scott led a party to the South Pole that sadly never returned. He wrote a letter to his wife asking her to ensure that their son grew up with an interest in the natural world. His son, Sir Peter Scott, became the founder of WWF.

Fuzz Dyer talked about Anna Merz

Anna Merz was a true hero and ambassador for conservation. Passionate about wildlife, she founded Lewa Wildlife Conservancy's rhino sanctuary in 1983 with the Craig family. Anna is the reason there are now so many rhinos in Kenya.

Natasha McElhone's hero was James Miranda Stuart Barry



James Miranda Stuart Barry was born a woman, but in the 1800s only men could go to university, so she disguised her gender. She became a military surgeon in the British army. Barry carried out the first caesarean section in which both mother and child survived.

Jaco van Gass spoke about true heroes

Jaco served on tours to Afghanistan with the British Army, but was injured when a rocket was propelled at him injuring his arm. Life is 10% what happens to you and 90% how you respond, and true heroes are ones that make the ultimate sacrifice.

Ed Smith chose Roger Federer, Richard Wagner and Vikram Seth



Ed's heroes had all gained success, but remained true to themselves, and contributed something original to their field. Roger Federer may be the most successful tennis player of all time, but still demonstrates his love and passion for the game.

William Fiennes chose Anton Chekhov

Chekhov worked as a doctor, but over his life he wrote 600 short stories. His father had to flee with his family to Moscow to avoid debtor's prison, and whilst researching a story, Chekhov travelled to a prison in east Russia to interview inmates. He campaigned for prison reform.



The dinner raised over £45,000 for rhino conservation programmes in Africa and Asia: thank you very much indeed to the speakers, to MC Clive Anderson, to our committee, the donors of auction and raffle prizes, and to all those who came.