

## Lion populations may be declining in Africa but not as Bauer et al. suggest

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Historical knowledge and recent surveys attest that lions are declining across parts of Africa (1, 2). We applaud Bauer et al. assembling available counts because they motivate better monitoring and conservation support. Their own data, however, reject their claims that lions are “declining everywhere, except in four southern countries” and that lions increase only where “intensively managed.”

First, there are some stable and increasing populations in all regions. Moreover, not weighting for population size strongly biases regional population projections. By treating all populations — small and large — equally, the authors mislead on the overall trend of lion populations. In Southern Africa, of 21 populations only one (Okavango) shows a decline, but the increasing populations are mostly in small, fenced reserves that, combined, support few lions. Niassa is a large, increasing population but considered a “special case.”

Of nine West and Central Africa lion populations, the largest are stable (Bénoué, 200) or increasing (Pendjari, ~100). The declining populations are the smallest, with starting populations of fewer than 70 lions. In East Africa, of 15 populations, 4 are increasing, and 4 are stable. Only 4 show declines strong enough to halve in 20 years ( $\lambda < 0.965$ ). Maasai Mara and Katavi are the only large populations showing such strong declines.

Second, Bauer et al. misrepresent the data from these two sites:

*Maasai Mara*: Supplementary Dataset S1 records 483 lions in 1991 and 286 individuals in 2005. The corresponding dates and densities (3) — 31.56 lions/100 km<sup>2</sup> and 18.69 lions/100 km<sup>2</sup> — do not match those in their assumed respective citations (4, 5) — 29.4 lions/100 km<sup>2</sup> in 1992 and 36.9 lions/100 km<sup>2</sup> in 2003 (Ref (6) does not mention lions). References (4, 5) actually show lions *increasing* from 450 to 560 individuals between 1992 and 2003.

*Katavi*: The Katavi data are from road transect surveys designed for herbivores (7). Extrapolating from these transects of limited length and frequency — and hence few lion observations — to the whole park distorts. This is evidenced by a 2005 playback survey that

estimated 168 (77-468) lions in the park (8), and continuing recent documentation of lion prides (9). Bauer et al. neglect these data and report 0 from 2002 onwards.

Finally, claims of the efficacy of fencing for lion conservation are misplaced (10). For example, contrary to statements (Fig. S2), Kgalagadi and is not completely fenced while the eastern side of Kruger National Park has not been fenced since 2002. Moreover, small fenced reserves make questionable contributions to lion conservation (10).

Certainly, serious threats are mounting and demand attention. That said, it is premature, indeed insensitive, to level blanket criticism at countries outside Southern Africa. The data show that authorities have maintained effective protection for many lion populations and should be congratulated where they have succeeded. Conservationists should also be wary of overstating widespread declines. If such claims are later rejected, science loses credibility. Conservation needs transparency in methods and data, and honest appraisal of the evidence and considerable uncertainties. Bauer et al. have not provided these.

1. Henschel et al. 2014
2. Riggio et al. 2013
3. Packer et al. 2013
4. Ogotu & Dublin 1998
5. Ogotu et al. 2005
6. Ogotu et al. 2011
7. Caro 2011
8. Kiffner et al. 2009
9. <http://www.nomad-tanzania.com/blogs/chada-katavi>
10. Creel et al. 2013