

**AUTHORS:**

Graham I.H. Kerley¹ 
 Kevin G. Behrens²
 Jane Carruthers³
 Marius Diemont⁴
 Jurie du Plessis⁵
 Liaan Minnie^{1,6}
 Michael J. Somers⁷ 
 Craig J. Tambling⁸
 Jane Turpie⁹
 Sharon Wilson¹
 Dave Balfour¹

AFFILIATIONS:

¹Centre for African Conservation Ecology, Nelson Mandela University, Port Elizabeth, South Africa
²Steve Biko Centre for Bioethics, University of the Witwatersrand, Johannesburg, South Africa
³Department of History, University of South Africa, Pretoria, South Africa
⁴Webber Wentzel, Cape Town, South Africa
⁵Department of Mammalogy, National Museum, Bloemfontein, South Africa
⁶School of Biology and Environmental Sciences, University of Mpumalanga, Nelspruit, South Africa
⁷Eugène Marais Chair of Wildlife Management, Mammal Research Institute, Centre for Invasion Biology, University of Pretoria, Pretoria, South Africa
⁸Department of Zoology and Entomology, University of Fort Hare, Alice, South Africa
⁹Environmental Policy Research Unit, School of Economics, University of Cape Town, Cape Town, South Africa

CORRESPONDENCE TO:

Graham Kerley

EMAIL:

graham.kerley@mandela.ac.za

HOW TO CITE:

Kerley GIH, Behrens KG, Carruthers J, Diemont M, Du Plessis J, Minnie L, et al. Building assessment practice and lessons from the scientific assessment on livestock predation in South Africa. *S Afr J Sci.* 2019;115(5/6), Art. #5766, 4 pages. <https://doi.org/10.17159/sajs.2019/5766>

ARTICLE INCLUDES:

- Peer review
- Supplementary material

KEYWORDS:

evidence-based policy; adaptive management; transdisciplinary; livestock; predation

PUBLISHED:

29 May 2019

© 2019. The Author(s). Published under a Creative Commons Attribution Licence.

Building assessment practice and lessons from the scientific assessment on livestock predation in South Africa

After at least two millennia of human–wildlife conflict over the predation of livestock in South Africa¹, the recently completed scientific assessment on livestock predation² (PredSA) brings the power of a formal scientific assessment to focus on the topic. PredSA represents a global first in terms of applying this increasingly recognised approach to informing policy to the issue of livestock predation at a national level. Here we explore the process behind the assessment, its structure and policy relevance, and some lessons learnt and suggest some avenues for the way forward.

Scientific assessments are a relatively recent societal tool. Operating at the science–policy interface, they serve to collate and interrogate transdisciplinary information relating to a complex problem and, through consensus, evaluate the relevance of the findings to policy development. Having emerged over the past three decades, there is a growing body of best practice guiding the basis for scientific assessments and how these should be conducted.³ Briefly, an assessment should have demonstrable legitimacy (a valid issue requiring attention at the behest of a relevant authority), saliency (the focus on stakeholders’ interests in the problem) and credibility (reflecting scientific rigour by recognised experts) to be accepted by, and useful to, society.³ To achieve these criteria, the governance of an assessment process needs to be transparent and demonstrate a commitment to being broadly participatory.^{3,4}

The need for an assessment on livestock predation in South Africa was identified by the national Departments of Environmental Affairs (DEA) and Agriculture, Forestry and Fisheries (DAFF), as well as the livestock industry. Discussions around this need developed through the Predation Management Forum, the latter representing the wool, mohair, red meat and wildlife industries, as well as the regulatory bodies. Financial support was provided by DEA and DAFF as well as the National Wool Growers Association, Mohair Growers Association and the Red Meat Producers Organisation. This support reflects the legitimacy of the assessment, emerging as it does from both the policy/regulatory domain and stakeholders directly affected by predation on livestock.

The Minister of Environmental Affairs and the Department of Agriculture, Forestry and Fisheries formally endorsed PredSA at its launch in 2016.⁴ The route to the assessment launch, however, started in 2010 with dialogue between the abovementioned role players and the Centre for African Conservation Ecology (ACE) at Nelson Mandela University. This dialogue, facilitated by seed funding from Woolworths SA, resulted in a proposal for the assessment to be hosted by ACE, which engaged recognised experts nationwide and followed the transdisciplinary approach of the 2008 Elephant Management Assessment.⁵

The process

A key early step in PredSA was the establishment of a governance framework to ensure that the requirements of saliency, credibility, transparency and participation were adhered to during the assessment. Guided by the framework developed for the Shale Gas Assessment⁶, a ‘process document’ articulated these commitments and provided for an independent ‘Process Custodianship Group’ (PCG) that was tasked with overseeing the fairness of the process but with no mandate to influence the content or perspectives of the authors. The PCG comprised representatives from industry (two individuals), both affected government departments (a representative each), an independent environmental non-governmental organisation (a representative) and an independent academic. The independence of the PCG was strengthened by the appointment of an independent chair.

The PCG reviewed and confirmed the proposed structure and scope of the assessment, thus defining the manner in which the issue of livestock predation would be addressed – thereby confirming its saliency. The PCG then reviewed the names and credentials of proposed lead authors, and subsequently the contributing authors (proposed by the lead authors collectively) for each chapter to ensure the credibility of the assessment. In executing its tasks, the PCG paid attention to ensuring that the appointment of authors was used as an opportunity to contribute to transformation and development objectives of South Africa. Additionally, the PCG reviewed the appointment of external reviewers (as proposed by the authors collectively) in terms of their independence and recognition as experts, as well as for their diversity and international representation.

Scientific assessments culminate in a body of information captured in a document. The process to generate this document follows a series of steps. Starting with a zero-order draft (document structure with brief detail, compiled by the lead authors), through a first-order (ready for technical review, compiled by the full author team), then second-order (ready for stakeholder review) draft leading to a final product. The PCG oversaw the process, ensuring transparency and credibility, to generate each of the drafts. The first-order draft underwent a technical review by a team of 24 recognised, independent experts (of whom 9 were from outside South Africa), and was then revised by the authors. All the reviewers’ comments were made available online and author responses comprehensively documented for presentation to the PCG. The second-order draft was then made available for public stakeholder review. Stakeholders were alerted to the opportunity to provide input through various fora (e.g. National Wool Growers Association, Predation Management Forum, South African Wildlife Management Association), agricultural publications, and also through targeted emails directed to known interest groups and individuals. Stakeholders were invited to register on the PredSA website in order to provide their input. Stakeholder input was captured through an online process and documented, together with the authors’ responses, for presentation to the PCG, and available online for transparency.

The PCG verified that each comment by the reviewers was formally addressed in an appropriate manner by the authorship team. This led to the final assessment product.

Filling information gaps

Early in the process, the team leading the assessment recognised that there is little information in the literature on livestock predation or its management in rangeland under communal tenure. It was clear that this information gap would have unknown implications for policy development, and therefore limit the relevance of the assessment. This gap posed a challenge, as the collection of data does not typically fall within the scope of scientific assessments.³ In a departure from the conventional focus of an assessment of collating existing information, the PredSA team chose to address the gap. A survey of the nature of livestock predation and its management in communal rangelands was commissioned and undertaken by an independent research group already working in communal rangelands. Interview-based data were collected in seven communal rangelands in the country and the resulting report⁷ was used to inform the assessment.

The product

The completed assessment² is presented in the form of a 280-page book, which was published in November 2018 and is available in traditional printed form as well as an e-book. The nine chapters (each functionally a peer-reviewed paper) cover a broad range of topics – highlighting the inherent transdisciplinary nature of human–wildlife conflict including: the background to the assessment, the history, socio-economic impacts, ethics, law, and management of the conflict, as well as chapters on the black-backed jackal *Canis mesomelas* and the caracal *Caracal caracal*, other predators implicated in livestock predation, and the role of mesopredators in rangelands. There is, in addition, a summary for policymakers⁸, which is a distillation of the assessment into a format that is policy relevant. A total of 43 authors contributed to the writing of the assessment, representing the diversity of disciplines reflected in the chapter structure. The authors represent 22 institutions across South Africa (some being affiliated to more than one institution). This transdisciplinary and multi-institutional engagement highlights the networking value of an assessment and the potential for building research collaboration among the contributors.

Key messages to policymakers

An assessment's key role is to inform policy, and PredSA provides a number of key messages to policymakers, these are summarised here.

There is an urgent need for legislation addressing livestock predation and its management across South Africa to be updated and standardised. As a consequence of South Africa's complex political history and the associated complexity of the development of legislation, the current applicable legislation varies across, and even within, provinces.⁹ The constitutional recognition of concurrent national and provincial responsibility towards environmental management requires extensive and ongoing coordination and revision of legislation to ensure there is a uniform legal framework regulating the management of livestock predation.

The assessment has placed the **economic costs of livestock predation in better perspective.** Previously published statements of livestock predation costing in excess of ZAR1 billion per year¹⁰, are contextualised. A conservative estimate of losses as a result of livestock predation equates to about 0.5% of the Agriculture, Forestry and Fishing sector's GDP and 0.01% of national GDP.¹¹ Thus livestock predation appears to have a relatively small impact at the national scale. From a policy perspective, this figure needs to be balanced against the impact of losses borne by individual farmers, and the consequences for rural livelihoods, employment and food and fibre security. These issues are particularly pertinent in marginal farming areas where many households are poor and losses from livestock predation could have significant impacts and possibly contribute to increasing social tensions.¹¹

Both communal and commercial farmers face the same fundamental predation management challenges; these challenges revolve largely around the main predators of livestock (black-backed jackal and caracal)

and the legislative framework. A clear difference lies in the capacity of each group to absorb predation losses financially, and to invest in the management of predators' impacts on livestock.¹² There is also an imbalance in the research effort on livestock predation in communal vs commercial areas¹, and research and funding institutions need to address this imbalance as a matter of urgency.

Effective predation management is likely to consist of a range of complementary methods/activities (including selective, humane lethal methods where necessary) and no single approach should be regarded as a 'silver bullet solution' to the problem. A multitude of management methods aimed at reducing the impact of predation on livestock has been attempted – much of the time there is, however, insufficient scientific information to confirm or contest their effectiveness.¹² Reported impacts of these management approaches vary, depending on many factors, as well as spatially and temporarily. There is a strong and urgent need for applied research of high scientific standards (i.e. randomised with repeats and controls) to better inform policy development around predation management.

There is a growing appreciation of the need to understand the biodiversity consequences of removing both the apex predators and the mesopredators from a landscape. Our current understanding of the issue is limited to recognising that there will be consequences and that these consequences will likely be broad and ecosystem specific.¹³ PredSA highlights the fact that we have much to learn about the ecosystem responses to predator management in order to anticipate and address unexpected consequences.

The assessment highlights that **much research still needs to be done in the field of livestock predation and its management.** The gaps in knowledge that need to be addressed through additional research were identified and listed in each chapter. This information will assist researchers and funding agencies to develop strategic research plans and funding priorities.

It is apparent when undertaking a transdisciplinary exercise like PredSA that research into the issues around livestock predation, and its impact and management, has historically proceeded in a series of independent and unconnected initiatives, with few exceptions. In contrast, it is clear that the legislative and management solutions need to be comprehensively integrated across disciplines. PredSA highlights that **we cannot afford to maintain the single discipline research approach of domain specialists**, and must also recognise the role of policymakers and livestock managers in contributing to developing solutions. We need to advance our approaches to managing livestock predation through an explicit commitment to coproduction of knowledge.¹⁴ This will need to be achieved through collaborative (including researchers, policymakers and farmers) and multidisciplinary research. Furthermore, an adaptive management framework is recommended that provides an effective mechanism for scientists, policymakers and managers (farmers) to identify key research questions and address them in a collaborative fashion which improves our management of the problem.

Lessons around scientific assessments

Setting up an assessment is not a trivial task. It requires initiative to identify the problem, buy-in from the 'clients' (those for whom the assessment problem has relevance³) and funding. For PredSA, this process started in 2010, and was originally focused on the problem of predation on small livestock, reflecting the initial interest in an assessment by the sheep-farming sector. Expanding the focus to predation on all livestock reflected the broader interest of the two government departments, as well as the Predation Management Forum. Only in 2016 was the full range of clients identified (now including all elements of the livestock industry and government), the central question finalised, and the funds secured. In contrast, undertaking the assessment was relatively quick – requiring under 2 years from launch to the completion of the book ready for printing. Those interested in undertaking or commissioning assessments therefore need to recognise the potentially long lead time before the actual assessment.

Scientific assessments are undertaken by individuals on a voluntary basis who benefit from the learning, recognition and increased publication outputs.³ However, it is not only established experts who can contribute and benefit. Scientific assessments can serve as developmental opportunities, bringing younger and underrepresented scientists into a mainstream opportunity. PredSA specifically encouraged and facilitated the inclusion of younger and underrepresented (in gender and demographic contexts) scientists as authors and reviewers. This inclusivity takes effort as these individuals are not necessarily as well known in the established scientific community and may need to be 'sought out'. In the case of PredSA, individuals were able to benefit, learning about the process of collaboration and producing an assessment, building networks and gaining confidence in their own ability to contribute meaningful science, while at the same time boosting their curriculum vitae and publication records. There is risk in securing authors, with some individuals not being able to keep to their initial commitments. From a national perspective, PredSA provided an opportunity for individuals to develop capacity necessary to address the growing numbers of complex societal problems that are best addressed through an assessment.

Obtaining stakeholder input into societal processes can be a challenge. The PredSA process reached out to stakeholders through a variety of channels, including through the Predation Management Forum (representing livestock producers and the affected government departments), learned societies, and targeted requests for input to known interest groups or individuals. Stakeholder input from the communal farming sector was encouraged through existing mechanisms established by the National Woolgrowers Association and Conservation South Africa. This raised difficulties relating to technology (the input was channelled through the PredSA website) and language (the assessment material is in English). These issues were not budgeted for. The absence of stakeholder input from the communal farming sector highlights the need for those planning scientific assessments to identify potentially marginalised stakeholder groups in advance and plan (and budget) accordingly to facilitate input from these groups. Input from individual commercial farmers was also limited. A further broad category of stakeholder that was underrepresented in the stakeholder feedback was that of those government officials tasked with implementing the legislation around predation management. While there was input from the NSPCA, there were no contributions from other animal welfare and rights groups, despite specific requests to known representatives of such groups. As a consequence, the stakeholder input received was largely focused on the management and scientific aspects of the assessment. Clearly, a focused outreach process to create awareness around an assessment, and to encourage and facilitate stakeholder engagement, is a key investment for future assessments.

Assessments are specifically designed to interrogate existing knowledge around a focal problem, and not to undertake novel research.³ However, where there is a known knowledge gap (as in the case of the information on livestock predation in communal farming areas identified here), the assessment leadership should consider the option of commissioning a strategic, focused and independent research project to address this gap. When considering such a research intervention, it is important to ensure that delivery of the results is within the assessment timelines. It is also important to ensure that the outcomes are publicly available, even if this is via email on request. The alternative of not addressing a known, but potentially fixable, knowledge gap is that the period of relevance of the assessment will be considerably shortened.

Way forward

A number of scientific assessments have been undertaken in South Africa. These include the regional Millennium Ecosystem Assessment in 2004¹⁵, Elephant Management in 2008⁵, Shale Gas SEA in 2016⁶, and now PredSA in 2018. In addition, South Africans are active participants in international assessments, most notably the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and contribute to the literature on assessment practice.^{3,4} Clearly, South Africa is developing capacity

to undertake scientific assessments, albeit in an ad-hoc manner. It would be valuable to develop formal training in this field, as well as to encourage South Africans to publish on best practice and lessons for assessments. It is also notable that the assessments undertaken within South Africa have been largely environmental in their focus. While this is in line with the National Biodiversity and Research Evidence Strategy¹⁶, it would be valuable to roll out this approach of undertaking assessments to other areas of societal interest.

The fact that Africa lacks 'synthesis centres' has recently been highlighted and identified as a limit that African nations face in developing capacity to address big issues facing society.¹⁷ In contrast, beyond the continent a large number of such centres have been developed.¹⁸ Presumably, this lack of African synthesis centres reflects resource constraints. One way to overcome this lack of synthesis capacity is to explicitly recognise that scientific assessments serve as virtual, highly focused, synthesis centres that can be initiated on demand, and which are cost effective because of the high levels of focus and small, efficient management teams. Adopting this approach does, however, carry the risk of the opportunity costs of missing institutional memory that synthesis centres provide. Alternatively, it may also be argued that the review and stakeholder consultation aspects of a scientific assessment avoids the risks of a synthesis centre becoming an 'ivory tower'. This perspective highlights the value of growing assessment capacity in South Africa and facilitating its development elsewhere in Africa.

A scientific assessment is by definition an attempt to contextualise the policy relevance of existing knowledge for a specific societal challenge, reflecting societal values at the time of the assessment. Given that both the state of knowledge and the societal values change, each assessment will become less relevant over time and need to be repeated after a period. What triggers a re-assessment is not currently clear. Developing a measure of when an assessment's findings are falling behind current knowledge and changing societal views, as well as mechanisms to rapidly and efficiently redo assessments, will be key steps in growing the use of assessments, and also ensuring the policy derived from assessments is current and topical.

The topicality of assessments clearly reflects their ability to serve their ultimate purpose of informing policy to address a focal issue. In systems where baselines¹⁹ are rapidly changing, assessments will need to include these shifts to maintain their relevance. Three examples illustrate how such shifting baselines were either effectively addressed in PredSA, or not. The first issue is that of the re-establishment of populations of large predators within areas of South Africa from which they had been extirpated.^{1,20} This poses a challenge as policymakers and livestock managers need to be aware of this process and 'lift their baselines' to accommodate changing circumstances.²¹ This point was effectively identified in PredSA.¹ The second issue is that of how climate change may influence livestock predation and its management, through, for example, altering the natural prey base of predators or changes in livestock management. This point was touched upon briefly in PredSA, but merits further focus. This focus will, however, require more scientific research on the relationships between climate change and livestock predation. The third issue, that of accelerated land reform in South Africa, sprang to the forefront of societal issues in South Africa as the assessment was drawing to a close. Given that land reform may profoundly alter the dynamics around management of livestock predation, this development needs to be considered by policymakers, but may first require an extensive research programme to provide the scientific evidence to support policy development.

Concluding comments

PredSA delivered on its original mandate of timeously providing an effectively governed scientific assessment on the contentious issue of livestock predation. In addition, by setting the precedent of a scientific assessment commissioning research, PredSA has contributed to the growing body of assessment practice. Finally, PredSA has also contributed to developing assessment capacity in South Africa.



This assessment was conducted at a national level. As the body of practice around dealing with complex societal problems expands, thought will need to be given to the issue of what scale of question – i.e. local, national or international – is appropriate for which to use an assessment methodology. There are clear demonstrations, cited earlier, supporting assessments at the global and national levels, but what of a question at the level of a province or a city?

One of the remaining challenges is for policymakers to be able to effectively use the assessment product, which despite its focus on policy relevance, is still technically dense and heavily scientific in its language. This is the nature of the beast. Few policymakers, particularly politicians, are comfortable when faced with a body of evidence such as this. A step in the right direction would be to empower policymakers with the capacity to ask key questions as to the implications and limitations of the available evidence²², and grow their understanding of the issue. They can then craft this understanding into policy. The current policy aimed at developing evidence-based environmental policy in South Africa¹⁶ is silent on the capacity of decision-makers (or their advisers) to be able to understand, interrogate and interpret scientific evidence. This gap needs to be addressed to provide an environment in which the full power of scientific assessments can be brought to bear on robust policy development.

Acknowledgements

We thank Robert Scholes and Greg Schreiner for their guidance and support when we were initiating the assessment, and their encouragement to write this Commentary.

References

1. Balfour D, Kerley GIH. Introduction – the need for, and value of a scientific assessment of livestock predation in South Africa. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 15–29.
2. Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018.
3. Scholes RJ, Schreiner G, Snyman-van der Walt L. Scientific assessments: Matching the process to the problem. *Bothalia*. 2017;47, Art. #a2144, 9 pages. <https://doi.org/10.4102/abc.v47i2.2144>
4. Kerley GIH, Behrens KG, Carruthers J, Diemont M, Du Plessis J, Minnie L, et al. Livestock predation in South Africa: The need for and value of a scientific assessment. *S Afr J Sci*. 2017;113:17–19. <http://dx.doi.org/10.17159/sajs.2017/a0198>
5. Scholes RJ, Mennell KG, editors. *Elephant management: A scientific assessment for South Africa*. Johannesburg: Witwatersrand University Press; 2008. <https://doi.org/10.18772/22008034792>
6. Scholes RJ, Lochner P, Schreiner G, Snyman-van der Walt L, De Jager M, editors. *Shale gas development in the Central Karoo: A scientific assessment of the opportunities and risks*. Pretoria: Council for Scientific and Industrial Research; 2016.
7. Hawkins H-J, Muller H. *Experiences and perspectives of communal livestock farmers in relation to predation*. Cape Town: Conservation South Africa; 2017.
8. Kerley GIH, Behrens KG, Carruthers J, Diemont M, Du Plessis J, Minnie L, et al. Summary for policymakers. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 7–14.
9. Diemont M, Glazewski J, Moneledi DF. Legal considerations in the management of predation on livestock. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 106–124.
10. Van Niekerk HN. *The cost of predation on small livestock in South Africa by medium sized predators [MSc thesis]*. Bloemfontein: University of the Free State; 2010.
11. Turpie JK, Babatopie A. The socio-economic impacts of livestock predation and its prevention in South Africa. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 53–61.
12. Du Plessis JJ, Avenant NL, Botha A, Mkhize NR, Müller L, Mzileni N, et al. Past and current management of predation on livestock. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 125–177.
13. Tambling CJ, Avenant NL, Drouilly M, Melville H. The role of mesopredators in ecosystems: Potential effects of managing their populations on ecosystem processes and biodiversity. In: Kerley GIH, Wilson SL, Balfour D, editors. *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University; 2018. p. 205–227.
14. Hickey G, Richards T, Sheehy J. Co-production from proposal to paper. *Nature*. 2018;562:29–31. <https://doi.org/10.1038/d41586-018-06861-9>
15. Scholes RJ, Biggs R, editors. *Ecosystem services in southern Africa: A regional assessment*. Pretoria: Council for Scientific and Industrial Research; 2004.
16. South African Department of Environmental Affairs (DEA). *National biodiversity research and evidence strategy (2015-2025)*. Pretoria: DEA; 2016.
17. Trisos C, Lavery C, Periera L. Why Africa needs a science synthesis centre to tackle complex problems. *The Conversation*. 2018 August 13. Available from: <https://theconversation.com/why-africa-needs-a-science-synthesis-centre-to-tackle-complex-problems-81846>
18. Anon. The International Synthesis Consortium [webpage on the Internet]. c2018 [cited 2018 Nov 04]. Available from: <http://synthesis-consortium.org/>
19. Pauly D. Anecdotes and the shifting baseline syndrome of fisheries. *Trends Ecol Evol*. 1995;10:430. [https://doi.org/10.1016/S0169-5347\(00\)89171-5](https://doi.org/10.1016/S0169-5347(00)89171-5)
20. Boshoff AF, Landman M, Kerley GIH. Filling the gaps on the maps: Historical distribution patterns of some larger mammals in part of southern Africa. *Trans Roy Soc S Afr*. 2016;71:23–87. <http://dx.doi.org/10.1080/0035919X.2015.1084066>
21. Roman J, Dunphy-Daly MM, Johnston DW, Read AJ. Lifting baselines to address the consequences of conservation success. *Trends Ecol Evol*. 2015;30:300–302. <https://doi.org/10.1016/j.tree.2015.04.003>
22. Sutherland WJ, Spiegelhalter D, Burgman MA. Twenty tips for interpreting scientific claims. *Nature*. 2013;503:335–337. <https://doi.org/10.1038/503335a>