

Feedback on the draft methodology for AusPlots-Rangelands, and potential applicability to forested ecosystems



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Background.

TERN has produced a discussion paper¹ outlining a draft methodology for ecosystem monitoring across a large number of permanent plots in Australia's rangelands. There are also suggestions that the methods could be suitable for use in a further plot network in the forested regions.

¹Foulkes, J. N, White, I.A, and Lowe, A. J. 2010. *Discussion Paper: AusPlots-Rangelands monitoring site stratification and survey methods within TERN (Terrestrial Ecosystem Research Network)*

The intention (see Executive Summary) is to provide a consistent, systematic, repeatable and widely accepted plot-based monitoring method, in order to determine change in biodiversity.

ESA was invited to provide feedback on the proposed methodology by drawing on the expertise of a wide group of ecologists around Australia. To achieve this, the draft methodology document was sent in February 2011 to a range of experts in both rangeland and forest ecology and monitoring. They were asked to comment on the following two questions, and were also invited to pass the request on to suitably-qualified colleagues:

- 1) Are the proposed vegetation and soil attributes and associated methods appropriate for the task in hand? If not, what changes are recommended?
- 2) Can the methodology in the draft paper be usefully applied to forest ecosystems? If not, how could the methods be modified?

Responses were received from: Associate Prof Paul Adam (Uni of NSW); Dr Teresa Eyre (Qld Dept of Environment & Resource Management); Dr. John Kanowski (Aust. Wildlife Conservancy); Prof Bill Laurance (James Cook Uni); Dr. John Ludwig (CSIRO); Dr Dan Metcalfe (CSIRO); Dr Lynda Prior (Uni of Tasmania, on behalf of Prof David Bowman); Dr Suzanne Prober (CSIRO, with input from Dr Kevin Thiele, WA Herbarium); Dr. David Tongway (CSIRO). Below, these responses have been summarised and synthesised by Carla Catterall (Griffith Uni); there is a possibility that some inaccuracies of paraphrasing have been introduced during this process – the original responses can be provided subject to agreement from authors.

NB. The above TERN document is a work in progress, and has more recently been further developed. Nevertheless some of the issues raised here merit ongoing discussion.

ESAs recommendation to TERN.

ESA recognises that TERN is a significant national funding initiative towards providing a collaborative research infrastructure in terrestrial ecology, but that to meet the main intent (see above) is a significant scientific and logistical challenge. As such, independent experts are generally willing to volunteer their time to providing informed critiques of draft plans. The scale and nature of this initiative, and its emphasis on research infrastructure and baseline measurement mean that it is extremely important that the final design and methods should be scientifically sound, based on the best current knowledge, widely supported by the ecological research community, and useful in the longer term. The costs of getting this wrong are very high, in terms of both funds spent and a consequent inability to detect meaningful and nationally-important ecological change.

Most respondents supported some aspects of the proposed methodology, however all respondents noted significant areas in which improvement was either desirable or essential. Details are summarised below. In view of the wide-ranging nature of these concerns, and the risk of perverse outcomes if the plot network and protocols established with TERN funds are not widely endorsed by the community of practising ecologists, the ESA TERN subcommittee recommends to TERN that the draft AusPlots methodology should be formally peer-reviewed by suitable experts and also more widely discussed within the scientific ecological community.

Such a review process could include: (1) contracting several independent experts to provide written assessment, (2) making the draft widely available in the ecological community with a pathway for input by interested individuals, (3) making use of an expert workshop process (perhaps through ACEAS) to further develop the methodology, and (4) following these steps with a further cycle(s) of subsequent modification.

We further recommend that the current draft methodology would not be suitable for use in forested regions without extensive modification based on wide consultation with forest ecologists.

Overview and compilation of specific responses

- **Site selection** will be a major challenge. Existence of historical high-quality data should have high weighting in site selection (note that ESA's proposed ALTERP database of existing sites could help with this). Plot selection should go beyond current rangeland/bioregion boundaries and incorporate predicted climate-change boundary zones. Site governance and security in the long term needs some consideration.
- **Stratification** as proposed is a sensible approach, in all ecosystem types including forests. However, the total number of sites has not been stated and there need to be much clearer statements about site numbers, replication and the spatial design in general – and how this relates to the AusPlots goals and conceptual framework (for example how could the proposed method differentiate between annual and seasonal change?).
- The **100m X 100m plot size** has been used in many ecosystems including forests, but the forest ecologists unanimously stated that there are huge costs per plot to fully survey 1ha in dense and diverse forests – this would mean that very few plots could be surveyed. Even for rangeland systems, the proposed requirement that the 100m square be stringently homogeneous should be reconsidered because it artificially devalues meaningful local variability and has been driven by current remote-sensing technology rather than ecological issues.
- **Data variability** is a major challenge and needs to be more explicitly considered in both (a) site selection/site replication and sampling methods; including how noise and variability will be quantified.
- The proposed **vegetation techniques** are insufficiently developed and rationalised. A fixed line-transect is a more efficient method than plot-scale vegetation cover for detecting changes over time (wheelpoints are imprecise, ephemeral cover is a low-information measurement when long-term change is an issue). Wooded landscapes also require data on tree diameters, not just cover. The point-intercept method may not work well for trees and shrubs, and will not be appropriate for complex dense tropical forests.
- **Fauna** have been dropped, apparently for cost reasons. However there should be explicit consideration of how to improve relevance to fauna – including potential links of these monitoring sites to other fauna data, and the measurement of specific vegetation/soil variables that indicate fauna habitat (eg, woody debris etc). There is just as much ecological argument for better linking veg. monitoring to fauna as there is for linking it to RS imagery.
- The proposed **soil techniques** are not well-chosen and reflect a laundry-list that needs to be better informed by knowledge of ecological processes (eg, total P is well known to be a poor predictor of plant P nutrition in native Australian ecosystems). Many of the chosen variables have very high intrinsic spatio-temporal variability, and hence the proposed data are likely to reconfirm already-understood macrospatial patterning rather than informing about changes in time or with land use.
- **Complex variables such as "resilience" and "land condition"** cannot readily be quantified using the methods described and have not been adequately considered. Need also to explicitly consider measuring regeneration. Surprising not to see any mention of the Australian Landscape Function Analysis methodology.
- Given the apparent compromises already occurring with respect to numbers of plots and ecological sampling, it is not clear why **genetic data** are being collected, at the expense of knowledge about species' ecological occurrences and changes – could be dropped or scaled back. The term "duplicate" has been used incorrectly with respect to reference specimens – duplicates need to come from the same plot (or very close plots).
- Need to explicitly consider and plan for **data retention, archiving, security and access**, including historical data – currently not mentioned at all.
- The proposal as currently written has not acknowledged that there is a good understanding of many ecosystem processes in Australian rangelands (internationally-esteemed research in peer-reviewed literature), and the methods would benefit if this knowledge was used to guide the details of proposed monitoring methodology.