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A comment: Functional feeding groups as a taxonomic surrogate for a grassland arthropod assemblage

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The severe degradation of grassland ecosystems in South Africa has necessitated the development of rapid assessment and monitoring methods, a task to which Buschke and Seaman (2011) have responded promptly. Their paper tests the use of functional feeding groups (FFG) as taxonomic surrogates for family-level dynamics in terrestrial arthropods, and concludes that "for rapid monitoring and snap-shot assessments, FFG could be used as a reliable taxonomic surrogate" (ibid.: 217). However, I contest this conclusion, and present three counter-arguments based on practical, technical and theoretical viewpoints. I also argue that the concept of biodiversity surrogacy, although dismissed by the authors, is possibly the most plausible solution.

Firstly, the idea that using FFG instead of family-level data will ease the taxonomic burden and expedite the assessment process is not necessarily true. The authors concede that "taxonomic surrogacy … implies that the same amount of information … can be obtained using a simpler methodology" (ibid.: 227). However, FFG classification is no simpler than family-level identification and may actually involve extra work. Family-level identification is the minimum requirement in order to assign FFG, at least in stream ecosystems (in which the FFG concept was first developed), although generic-level is advised (Merritt & Cummins 1996). In fact, for aquatic insect like Chironomidae and Baetidae, family-level identification is inadequate because different genera belong to different FFG. Kaiser *et al.* (2009) provide empirical evidence to support my assertion that assigning FFG is not quicker or simpler: they conclude that "the method proved to be tedious and the identification of insects taxing". So if the same effort is used to assign FFG and to get family-level identifications, then using FFG brings no advantages.

Secondly, I doubt that "many orders and/or superfamilies only have one feeding style" (Buschke & Seaman 2011: 219). The assignment of FFG is complicated and, at times, controversial, at least in South African stream ecosystems (King *et al.* 1988; Palmer *et al.* 1996). Some taxa may have too variable a diet to be assigned to only one FFG; in some cases adults & larvae have different FFG, while some taxa belong to different FFG in different parts of the world. For example, the family Baetidae is more functionally diverse (including both predators and shredders) in the Afrotropics than in temperate regions (Boulton *et al.* 2008). There is no empirical evidence to show that assignment of terrestrial arthropods to FFG is any easier, quicker and less controversial and, given the paucity of research on FFG in many terrestrial arthropods, I am not convinced that FFG can be readily rolled out for rapid assessment of grassland ecosystems. Moreover, the authors themselves (Buschke & Seaman 2011: 219) concede that "many of the FFG are strictly not *feeding* groups". In the light of this concession, it would have been necessary for the authors to show how they assigned individual taxa to the different FFG and also to give the attribute(s) on which the FFG were based (e.g., diet, food acquisition behaviour, food availability, mouth morphology, gut

content, *etc.*).Without such information it is difficult to accept or judge the technicality of their study.

Thirdly, there is virtually no theoretical framework supporting the concept of FFG in grassland arthropod communities. The FFG concept was developed to explain the changes or response of stream invertebrate communities to spatio-temporal changes in food sources (Vannote *et al.* 1980), not for the ecological assessment of stream conditions. Interestingly, even though the concept of FFG has been intensively studied in stream environments, it has proved unreliable for rapid bioassessments of stream ecosystems (e.g. Palmer *et al.* 1996). Given the incomplete understanding of FFG in terrestrial settings, it is inconceivable that FFG can be reliably used to assess the ecological integrity of this system. Furthermore, as far as I am aware there have been no empirical studies to show that FFG are responsive to the kind of perturbations (e.g. habitat fragmentation or degradation) that one might wish to assess in grassland ecosystems. Fundamental questions still need to be answered, namely, (1) what is the significance of an increase or decrease of certain FFG, other than in response to changes in food input?, and (2) which FFG are sensitive to disturbances? – as is the case, for example, in the South African Scoring System (Dickens & Graham 2002). Given that terrestrial food webs are more complex than aquatic ones, I suspect that the response of FFG in grassland ecosystems might be not as linear and predictable as in stream environments – and predictability is a key requirement in rapid assessment programs.

Lastly, the authors argue that they did not test biodiversity surrogacy but taxonomic surrogacy (Buschke & Seaman 2011). It is probably better to invest in biodiversity surrogacy, whereby limited resources are spent on better understanding the dynamics of a selected few taxa, and then to use that information to make inferences about community-wide dynamics. The concept of FFG is relatively new in grassland ecosystems, and it will be many years before it can be applied reliably. Instead, focusing on a few selected taxa guarantees that one can be relatively confident about something (e.g. focal taxa), whereas when using taxonomic surrogacy everything is speculative. My conviction is also supported by Kaiser *et al.* (2009), who tested the use of FFG in assessing South African grassland ecosystems and recommended focusing on selected taxa rather than the whole community. Incidentally, my view and that of Kaiser *et al.* (2009) are in line with the conclusions of other arthropod assessment studies from other terrestrial systems in the country (Uys *et al.* 2010; McGeoch *et al.* 2011).

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