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RESPONSE

Forest Restoration Is Forward Thinking

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It is not surprising to us that the topic of forest restoration is being discussed in the *Journal of Forestry*. It is a topic frequently bantered about in the literature; a quick search in Google Scholar for "forest restoration" generates more than 1 million hits. A significant portion of the debate centers on the search for succinct, holistic, universally accepted terminology, and we confess that we have recently contributed to that effort (Stanturf et al. 2014a, 2014b). Given the lack of consensus on definitions for each word, forest and

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restoration, it should not be surprising that once combined, the discipline struggles to find consistent terminology, and the resulting discussions can be confusing. As we see it, the problem is that forest restorationists (those discussing the theory and those engaged in the practice) often seek precise black and white terminology for every gradation of a topic that spans an infinite spectrum and combination of biological, ecological, and societal possibilities; thus, the definition of forest restoration, whether we like it or not, varies depending on context and is continuously evolving as esoteric points are discussed. In our recent articles (Stanturf et al. 2014a, 2014b), we spend considerable time dissecting, organizing, and defining terminology. Such constructs are a necessary evil to vigorously debate ideas but probably leave practicing foresters, land managers, policymakers, and the general public confused. The reality is that restoration, no matter how it is defined, is intimately and undeniably linked with management: you cannot have restoration, even passive restoration, without management (Zahawi et al. 2014). Although it may not be politically correct to say so, forest restoration is similar to forest management in that both rely on silviculture although sometimes forest restoration requires extraordinary measures (Stanturf et al. 2014b). Approaching it from a silvicultural perspective puts pragmatism back into play.

The recent discussion by Hart et al. (2015) is based on their perception (and they are not alone) that ecological restoration is reserved exclusively for recreating a historical condition, generally assumed in the United States to be the conditions before European influence (Society for Ecological Restoration 2004). We disagree with such a narrow definition and in fact do not believe that it is widely shared in the forest management community, at least when forest composition is considered. The progression in restoration circles away from this narrow perspective can be charted by referring to definitions and concepts in documents of the Society for Ecological Restoration or in academic restoration journals. Challenges to this narrow view, including experience from Europe where almost all landscapes have been heavily altered, led to a broadened view of the historic range of variability (Millar 2014). More recently, prominent restorationists advocated for a change of focus from looking in the rearview mirror to the view down the road (e.g., Choi 2007). Some have gone a step further, calling for a new discipline of intervention ecology (Hobbs et al. 2011). Others have resisted discarding restoration altogether but are adapting to a future orientation for ecological restoration (Clewell and Aronson 2013), similar to the view expressed by Hanberry et al. (2015).

We do agree with the ultimate conclusions of Hart et al. (2015): the value of management (i.e., restoration) is in the ecosystem properties provided, not solely in the recreation of some prior condition; focusing on the past assumes that historical conditions can resist current (i.e., invasive species) or future (i.e., climate) perturbations; and managers should focus on management toward producing stand conditions that favor resilience even if historical conditions are not restored.

Following these tenets is, in our view, the essence of contemporary restoration and more organizations embrace this concept than perhaps Hart et al. (2015) acknowledge. Because we are talking about forests in these discussions, functional restoration also means embracing silviculture as the management tool that alleviates many, if not all, of the stumbling blocks, points of conflict, and questions presented by Hart et al. (2015).

For the most part, we concur with the excellent summary by Hanberry et al. (2015) because their description of forest restoration and the points they make reiterate our recent discussions (Stanturf et al. 2014a, 2014b). Indeed, the point that restoration is forward thinking aligns with an intellectual linking of restoration and management, because silviculture nurtures forests toward a future desired state (the goal of restoration); that future desired state may or may not be a recreation of a historical condition.

We do think, however, that Hanberry et al. (2015) may have underestimated the degree of enlightenment of contemporary forest management when they call for a "wider and more flexible management than a narrow focus on returning ecosystems to the precise conditions of some historical time period" and rightfully indicate that such a narrow focus has increasingly less relevance in the face of rapid global change. In our experience, few public forest management agencies, at least, retain this narrow focus. In particular, the needed reference condition for restoration is increasingly recognized to be a contemporary functional reference state, rather than some poorly defined and perhaps irrelevant past state, and indeed that approach for identifying references is in itself not a new idea (Palik et al. 2000). A problem arises, nevertheless, when members of the public who have retained the focus on historic conditions cannot come to terms with changing terminology.

We appreciate the desire by Hanberry et al. (2015) to frame restoration broadly so as to include actions that position forests for an uncertain and rapidly changing future. However, they do seem to stretch the disciplinary boundaries by suggesting that managing forests for adaptability to an uncertain climate future can always be considered restoration. Might a point be reached in the quest to manage forests where we transition them to a new climate future without the task needing to be termed "restoration," even by the broad function definition cited by Hanberry et al. (2015)? Is the replacement of native tree species by a nonendemic, but future climate-adapted species that may be a functional equivalent, still restoration? We suggest that this deserves further discussion. Situations like this might become increasingly common, as well as deployment of seedlings of keystone species that have been genetically modified to overcome nonnative pests, and challenge the underlying naturalness paradigm of ecological restoration (Stanturf et al. 2014a). Perhaps new terminology and, dare we say, a new discipline of transition management or the aforementioned intervention ecology are discussions that are not misguided.

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