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A Reply to King et al.

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world. We suggested planning for "off world" colonization as a last resort and as a precautionary response to an unstoppable redesign of the Earth.

Holl and Loik argue that the large monetary sums needed for such colonization could be better spent directly on solving environmental problems here on Earth. It's hard to argue with that sentiment in the short term. A major increase in resources directed toward goals such as K–12 education and empowering women globally would be of great value, both environmentally and economically.

Yet, when we proposed the drastic step of considering space colonization, we were musing about the *long term* – because we believe that the deployment and extent of novel technologies will happen so fast, and may arrive with such intensity, that people may not have time to respond adequately. The increase in technological "progress" in the 21st century has been estimated to be of the same order of magnitude as that of the last 20 000 years (at today's rate of technological change; Kurzweil 2003). Under this scenario of technological transformation, our suggestion of a "couple of centuries" for deployment of humans to space might be too long.

The bulk of our editorial focused on the world today and in the near future. That's where we'd like the focus to remain, because no one has the remotest idea of what the continued emergence of the neoenvironment will mean for us, for societies, and for the rest of life on Earth. However, it's time we also started thinking about the distant future, which really may not be so far away.

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Kurzweil R. 2003. Promise and peril. In: Lightman A, Sarewitz D, and Desser C (Eds). Living with the genie: essays on technology and the quest for human mastery. Washington, DC: Island Press.

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Early-successional forest ecosystems: far from "forgotten"

In their article (*Front Ecol Environ* 2011; **9[2]**: 117–25), Swanson *et al.* provided an interesting review of the ecological characteristics of early-successional forests, but their implication that these forests are a frontier in terms of research, conservation, and management should be more closely examined. There is substantial evidence that the focus of research and conservation has shifted over the past decade from mature to early-successional forests. For example, a Web of Science search on "early, succession, and conservation; or early, seral, and conservation; or early, succession, and ecosystem" returned 416 citations published between 2001 and 2010. In contrast, this same search with "late" substituted for "early" returned only 254 references. Furthermore, the annual number of publications on this topic has increased ~300% over the past decade (Figure 1).

The extent of early-successional forest over much of North America – as indicated by historical accounts and paleoecological data – has decreased many fold during the past century on account of land-use changes and suppression of natural disturbances (DeGraaf and Miller 1996; Askins 2000). Consequently, the concentrated and increased interest in this topic has resulted in numerous symposia, reviews, and scholarly books, as well as the scientific articles referred to above, on the history of disturbance in forest ecosystems, the effect of disturbance on natural systems, and their importance to the conservation of birds, mammals, and invertebrates (eg DeGraaf and Miller 1996; Askins 2000; Thompson and DeGraaf 2001; Litvaitis 2003; Schlossberg and King 2007).

As a result, the conservation status of species that depend on early-successional forest is now widely appreciated by natural resource management agencies. Early-successional forest is identified as important in the Wildlife Action Plans of all nine New England states. State and federal agencies, as well as NGOs, spend millions of dollars annually to create or maintain early-successional habitat. Continental research and management plans have been developed for early-successional forest species, such as American woodcock (*Scolopax minor*) and golden-winged warbler (*Vermivora chrysoptera*).

With respect to outlining the broad range of ecological characteristics and processes, Swanson and colleagues do an admirable job. However, their focus on western

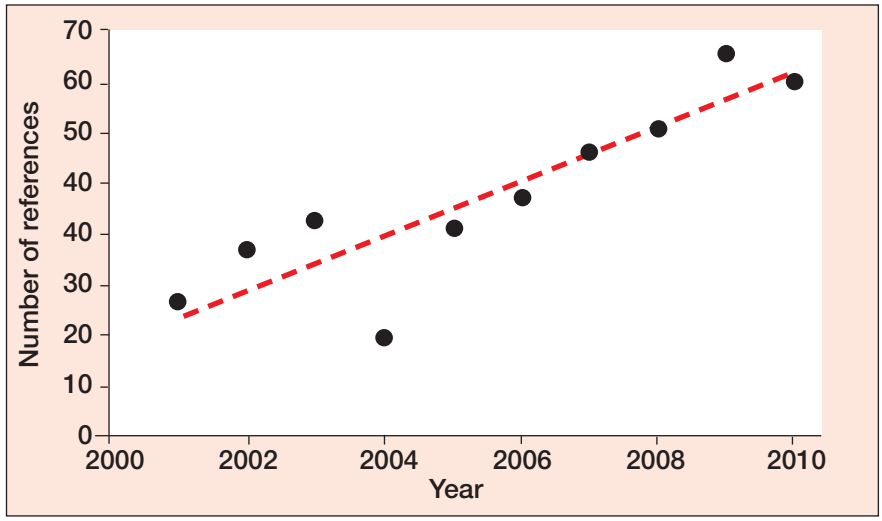

Figure 1. *Annual increase in number of references (416 altogether) resulting from a Web of Science search, conducted on 16 Mar 2011, for "(early AND succession AND conservation) OR Topic = (early AND seral AND conservation) OR Topic = (early AND succession AND ecosystem)".*

North American ecosystems affects their assessment of the conservation context of early-successional forests. Specifically, several of the conservation and management issues they point out are specific to regions with high relief, dominated by conifers, and where assisted regeneration is a general requirement. The inclusion of eastern temperate forests illustrates how the effects of management vary as a function of environmental context, which provides a valuable additional component of this kind of broad integrative review.

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Thompson III FR and DeGraaf RM. 2001. Special coverage – conservation of woody, early-successional habitats and wildlife in the eastern United States. *Wildlife Soc B* **29**: 407–94.

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A reply to King *et al.*

King *et al.* are correct in their assessment of an increase in research and management interest in early-successional stages after disturbance. But their claim that "...the conservation status of species that depend on early-successional forest is now widely appreciated by natural resource management agencies" merits further reflection. In numerous areas in which we have worked (the Pacific Northwest, northern Rockies, Australia, temperate South America, and elsewhere), we still see an abundance of management activity designed to eliminate the distinctive characteristics associated with early-successional stages through intentional spraying, planting, and cutting to speed "recovery" to later successional stages. Thus, holistic ecosystem management that includes broad recognition of the value of complex early seral conditions is still very much a management frontier. In the mountain ash (*Eucalyptus regnans*) region of Australia, for example, the post-fire salvage logging operations are rapidly destroying many valuable early-successional habitats that were created after the 2009 wildfires. There are also numerous examples of negative ecological effects of post-fire salvage-logging from western North America. Furthermore, several challenges remain to be met in many regions, even where the need for complex early seral forest is recognized. These include unbalanced predator–prey systems (eg overabundant white-tailed deer [*Odocoileus virginianus*] in the eastern US), which detrimentally affect early seral vegetation, and the potential for exotic plants to capitalize on natural or artificially created early seral areas.

We applaud the fact that New England is relatively advanced regarding this important stage of succession, due in part to the efforts of researchers such as King *et al.* However, much remains to be done in both research and management regionally and internationally to address the many factors that have caused the decline in early seral conditions that we discuss in our article, and in the thoughtful response submitted by King *et al.*

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Threats to Sri Lanka's urban wetlands

Sri Lanka's tropical ecosystems include several biodiversity hotspots featuring rich assemblages of endemic and endangered species (Myers *et al.* 2000; Meegaskumbura *et al.* 2002). Urbanization and other anthropogenic impacts, however, increasingly threaten the viability of remaining natural areas on many parts of the island. Particularly affected are wetlands within the western coastal belt of Sri Lanka, where the nation's capital – Colombo – and other large urban enclaves are located. These wetlands, among others on the island, are breeding grounds and resting areas for a host of indigenous and migratory bird species. However, because of weak regulations, lapses in enforcement, and perceived low economic value, wetlands are often readily exploited and reclaimed for building sites without concern for ecological or other environmental consequences. A particularly disconcerting issue is the frequent use of wetlands for municipal garbage disposal (Van Horen 2004; Wattage and Mardle 2005; Kotagama and Bambaradeniya 2006). Despite decades of effort to implement a sustainable municipal waste management system, Sri Lanka still lacks any properly engineered sanitary landfills (Bandara and Hettiaratchi 2010). In the absence of such proper infrastructure, thousands of tons of municipal waste are discarded daily in wetlands and floodplains (Figure 1). Among the severely affected wetlands is the