Genetic Values and Old-growth Conservation Policies

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Why should we be concerned about conserving old-growth forests? Old growth (OG) is aesthetically important to people, but what are the science issues pertaining to this question? Some professional foresters would maintain that OG consists largely of overmature, decadent, non productive trees whose fiber could be put to commercial use. Although this may be partly true for many older stands of early successional, fire-origin forest types of boreal regions, it may be far from true for the long-lived, late-successional, shade-adapted forest types of temperate or tropical zones that regenerate naturally through gap-replacement processes rather than following catastrophic stand replacement.

For instance, the species-rich, temperate-zone forests of eastern North America dominated by species such as red spruce (*Picea rubens*), eastern hemlock (*Tsuga canadensis*), sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), and to a lesser extent eastern white pine (*Pinus strobus*), can form multi-layered canopies with complex age-class structures. These forests have average ages of 150+ years with some trees at their maximum longevity of 350+ years (Mosseler *et al*. 2003a). These are remarkably beautiful forests (Fig. 1), but are now exceptionally rare because human activity has largely eliminated these forest types.

These forests are characterized by both standing and fallen trees in varying stages of decay. This structural complexity creates much of the habitat for OG-adapted or OG-associated wildlife. This habitat value has been the central focus of public pressure to preserve this type of forest cover. Unfortunately, these forests are now so rare that they run the risk of being eliminated from human consciousness as well as of being physically eliminated from our forested landscapes. Eventually we may no longer be arguing about OG conservation because there may be only a few people left with any memory or understanding of what such OG was.

Recent genetic studies have given us another important reason to value OG. Data from OG forests indicate that there may be important relationships between tree and stand age, and both genetic diversity and reproductive fitness (Mosseler *et al*. 2003b). Thus, older populations of trees may be important reservoirs of genetic diversity and seed sources for regeneration and survival of late-successional species in decline across the globe. This ecological function may be particularly important for the survival of species within an increasingly fragmented landscape and with respect to adaptation and survival under changing environments (e.g., climate change).

Therefore, as a matter of public policy, it may be important to consider protecting and conserving ecologically representative samples of OG forests across the landscape in order to ensure that late-successional populations and species continue to survive and

evolve. These late-successional forest types are an important component of forest biodiversity and natural beauty.

Papers cited:

Mosseler, A., Lynds, J.A., and Major, J.E. 2003a. Old-growth forests of the Acadian Forest Region. Environmental Reviews 11: 47-77.

Mosseler, A., Major, J.E., and Rajora, O.P. 2003b. Old-growth red spruce forests as reservoirs of genetic diversity and reproductive fitness. Theoret. Appl. Genet. 106: 931-937.

Fig. 1. Red spruce/hemlock dominated old growth in the Acadian Forest Region of the temperate zone of eastern Canada. (photo by A. Mosseler)