

Restoration Seed Reserves for Assisted Gene Flow within Seed Orchards **Echt, CS₁; Crane, B₂; Nelson, CD₃**

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Changing climate and declining forest populations imperil the future of certain forest tree species. To complement forest management and gene conservation plans, we propose establishment of seedling seed orchards from varied seed sources to increase diversity and adaptive potential of seed used for forest restoration. These “restoration seed reserves” (RSR) combine aspects traditional tree improvement with modern concepts of assisted gene flow and composite provenancing proposed for seed transfer strategies. A properly designed RSR, at maturity, has about 200 trees grown from seed representing 20 or more populations, avoids inbreeding by having no clones or families, selects only for seed production traits, and manages gene flow among proxy populations with an optimized planting design. The goal of RSRs is to provide restoration-ready seed with increased adaptive diversity beyond what is available from native seed sources. While not all RSR seed, or even most of it, will be fully adapted to any particular restoration site, the idea is that, as the stand becomes established, a high enough proportion of individuals will be naturally selected to adapt, survive, and successfully reproduce succeeding generations. RSRs obviously do not follow the “local-is-best” approach to gene conservation. When a species’ seed sources are from small, isolated, or inbred populations, however, then the diversity may be lacking for future restoration needs. RSRs can redress genetically depauperate local seed sources and provide suitable material for forest restoration of sensitive species in a changing climate.

As described, RSRs would be established on National Forest System Seed Orchards to produce seed for Nation Forest restoration plans. For arboretums, botanical gardens, and other organizations with a restricted land base, there are opportunities for partnerships with the National Forest System, Forest Service Research scientists, and NFGEL to meet their species conservation goals.