



## Seed collection zones for forest management

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### Background

Appropriate strategies for collecting seed that provide the raw genetic material for revegetation activities is an important issue for restoration or rehabilitation programs.

Current approaches regarding seed collection tend to follow a restrictive precautionary principle that advocates the use of only 'local' seed or seed of 'local provenance' for revegetation.

Traditional arguments for the use of 'local provenance' seed have included:

- assumption of strong local adaptation associated with genetic divergence over restricted geographic areas in plant species,
- concerns about the production of hybrid progeny that display outbreeding depression among genetically divergent populations, and
- concerns about other ecological interactions, e.g. invasiveness and displacement of the local form.



Regeneration in Jarrah forest



Jarrah forest

The Sustainable Forest Management Division of the Department of Environment and Conservation has adopted this precautionary approach regarding the collection of seed for forest rehabilitation purposes. This is a response to the 'local' requirement regarding the collection of seed that is stipulated in the Forest Management Plan 2004-2013. The term 'local' has not been defined but can be determined using scientific principles based on the context of the rehabilitation.

### Findings

Defining appropriate seed collection zones is a difficult task, and assigning a specific geographic scale or 'local' seed collection zone may not be possible or may not be the most appropriate approach. For most under-storey species used in current WA forest rehabilitation operations there is little information available regarding patterns of local adaptation and genetic diversity, the likelihood of hybridisation among genetically divergent populations, and the likelihood of invasiveness or other ecological interactions.

Delineation of seed collection zones varies for given taxa and restoration programs, and should be based on a number of considerations including:

- the aim of the restoration or revegetation program,
- characteristics of the site requiring restoration,
- patterns of local adaptation in species used for revegetation,
- partitioning of genetic variation in species used for revegetation, and
- availability and quality of seed sources.

## Management Implications

### *Recommendations*

An eco-geographic approach, where seed is collected from a number of large healthy populations at sites matched for environmental, edaphic and climatic variables with less regard to their geographic distance from the restoration site, may be a more appropriate strategy for seed collection than the exclusive use of material from geographically restricted areas.

Specific recommendations for collection of seed for forest rehabilitation operations include:

- Populations used as seed collection sites must be accurately identified at the subspecies level.
- Seed collection sites and rehabilitation sites should be matched for climatic, edaphic and other environmental variables.
- The requirement for rehabilitation with 'local' seed sources is reduced as levels of disturbance at the restoration site increase and the size of the restoration site decreases.
- The requirement for rehabilitation with 'local' seed sources increases as the level of disturbance at the site decreases, the size of the restoration site increases, if inter-fertile local populations are present, and if local adaptation is recognised.
- The likely partitioning of genetic variation within specific species should be evaluated to gain insight into the possible patterns of local adaptation.
- All seed sourced should be collected from healthy stands of sufficient size to ensure the quality of the seed supply.

A report that reviews the scientific basis for use of local provenance germplasm in revegetation, with particular reference to forest rehabilitation is available from the Forest Science Library at Kensington, or online below. It makes recommendations for seed collection zones for forest management in Western Australia based on these scientific principles.

Millar M, Byrne M and Coates D (2007) [Seed Collection Zones for State Forest Management](#). Report to Sustainable Forest Management Division, Department of Environment and Conservation. Perth.

